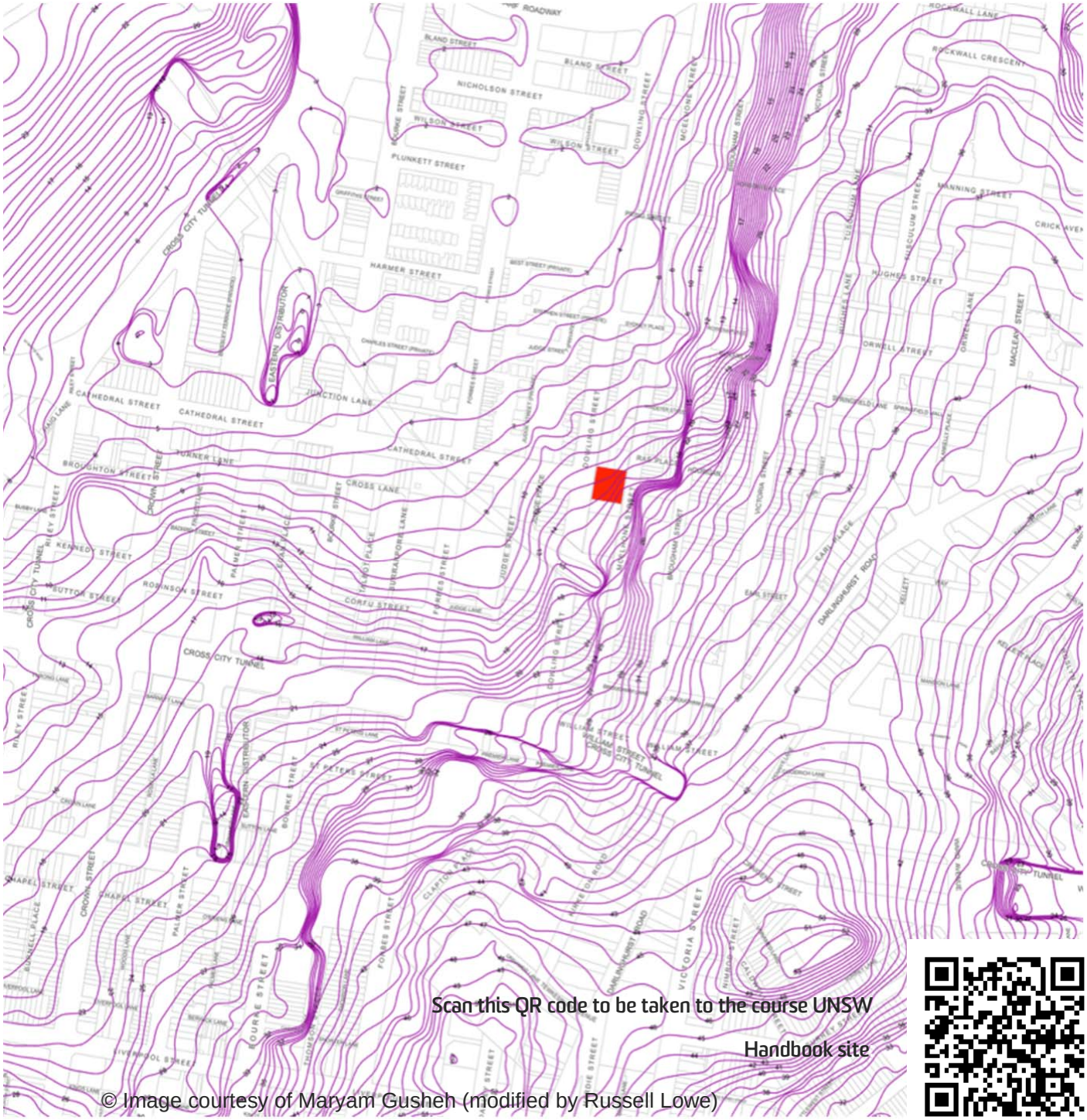
UNSW | Built Environment | Computational Design Program

Real Time Environments

CODE1240

Lectures: 9:00 – 10:00, Tuesday, Webster 256

Tutorials: 10:00 – 13:00, Tuesday, Red Centre West Wing 5006 – 5007 – 5008



Scan this QR code to be taken to the course UNSW Handbook site

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YEAR 1 | SEMESTER 2 | 2015

1. Course Description

The emergence of readily accessible real time rendering and physics engines offers an opportunity to revolutionise design. The influence of these technologies and approaches on form, space and environment is constantly increasing. While we think that it's only natural to experience our 3d designs in 3 dimensions in the year 2000 Lev Manovich said that 3d immersive environments were the way to visualise all data. One only has to look at the recent purchase of the Oculus Rift by Facebook for two billion dollars to see Manovich's prediction coming true. This course will place designers at the leading edge of spatial and environmental design by linking algorithmic modelling to the first person experience in real time. An understanding of parametric and algorithmic modelling is assumed. Learning and assessment is based on design experiments within a studio environment.

2. Course Staff

Course Convenor: Russell Lowe	
Room:	2026
Email:	russell.lowe@unsw.edu.au
Consultation times:	By appointment
Other Teaching Staff: Andrew Butler	
Room:	External
Email:	Andrew.Butler@cox.com.au
Consultation times:	Directly before or after class, please contact tutor one day in advance per email to make a booking.
Other Teaching Staff: Giulia Conti	
Room:	External
Email:	GConti@hassellstudio.com
Consultation times:	Directly before or after class, please contact tutor one day in advance per email to make a booking.

3. Course Communication

Most course related announcements are made in the lectures. It is essential that you attend the lectures to receive these announcements. In addition to these formal communication paths, online discussion forums will be available that will allow everyone to post questions and respond to other people's questions. All students will be expected to participate in the online discussions in the course forum.

Individual student related communication, including the issue of assessment grades and feedback, will be via UNSW Student email. All students are assigned an e-mail account on the University's e-mail server, so that email address will be used as the primary means by which important correspondence is made. You must, therefore, get into the habit of checking your UNSW student email regularly; or forward it to the email provider you check most often.

Details on setting up your UNSW student email are provided at:

https://www.it.unsw.edu.au/students/index.html

To manage your UNSW account and password, use the IDM site:

https://idm.unsw.edu.au/idm/user/login.jsp

Questions that cannot wait until the next allocated class are best handled by posting a message on the online forum. If there are important or urgent matters that require a personal meeting, you are able make an appointment with your course coordinator. See 3. for contact details.

4. Course Website

The main course website is located at www.russelllowe.com/code1240_2015/index.htm

Note: There is the potential that your lectures will be automatically recorded under the echo 360 platform:

https://teaching.unsw.edu.au/unsw-lecture-recordings-process

All OH&S and workshop training courses are as well located on Moodle. Please follow the Moodle instructions to complete UNSW's OH&S requirements.

5. Lectures

Week 1 Topic	**Course and Phase 1 Introduction: The Site.**
28 July.	Course introduction, Phase 1 introduction. Site introduction and the theory of Porosity. Deliverables include: 1 UE4 project folder, A comprehensive site model of the address above and the surrounding area (including terrain, roads and surrounding buildings), 1 x 90 second video animation showing a particle system representing quantitative data that has links to the site.
Readings:	"Richard Goodwin: Performance to Porosity" Craftsman House, 2006 ISBN: 0975768425 https://www.youtube.com/playlist?list=PLZlv_N0_O1gaCL2XjKluO7N2Pmmw9pvhE The written tutorials below are a good refresher once your watched the video tutorials above (focus, especially, on the "Level Designer Quick Start" and "Artist Quick Start" sections): https://docs.unrealengine.com/latest/INT/GettingStarted/index.html?utm_source=uelauncher&utm_medium=software&utm_campaign=learntab
Tutorial activities:	Site comprehension using supplied materials, Site research using online resources, UE4 youtube tutorials 1 – 11
Independent Study:	UE4 youtube tutorials 12 – 23. Begin constructing the manmade/orthogonal elements defining the site.
Week 2 Topic	**Scope (UE4)**
04 August.	This lecture introduces the UE4 content examples as both a description of scope and a provocation to exceed it.
Readings:	Please familiarise yourself with the content of following page: https://docs.unrealengine.com/latest/INT/Engine/Landscape/index.html
Tutorial activities:	Incorporate a landscape into the site model.
Independent Study:	Complete the site model.
Week 3 Topic	**Site Analysis**
11 August.	This lecture introduces the notion of site analysis focusing on a quantitative/computational point of view.
Readings:	"Richard Goodwin: Performance to Porosity" Craftsman House, 2006 ISBN: 0975768425 https://docs.unrealengine.com/latest/INT/Engine/Rendering/ParticleSystems/index.html http://pepethefrog.com/2014/06/01/beginner-getting-started-with-particles/
Tutorial activities:	Particle exploration. Review the UE4 content examples.
Independent Study:	Create a representation that links the parameters of a particle system with a quantifiable site condition.

Week 4 Topic **18 August.**	**Phase 2 Introduction: The Pavilion.** This lecture introduces the primary public element of the design; the pavilion. Deliverables for this phase will include 1 UE4 project folder, 9 Public Pavilions representing 3 distinct scripts, 9 sets of parameters, a passing grade in the IDDA Advanced Grasshopper course. 3 x 50-100 word statements describing the distinctiveness and significance of your designs. This lecture also introduces UE4 Blueprints and Preston Scott Cohens theory of the Terminal Line.
Readings:	"Terminal Lines", Architecture and Urbanism (A&U), Tokyo, Feb. 2000
Tutorial activities:	UE4 youtube tutorials 24 – 32
Independent Study:	Complete the tutorials above. Consider potential "Terminal Lines" that intersect with the existing site. Assignment 2 / Learning Step 1 **Grasshopper Advanced** (Exam to be completed and result uploaded by 23:59 on 6 September)
Week 5 Topic **25 August**	**Grasshopper Plugins (Andrew Butler)** This lecture introduces the plugins that students will be training on through the Institute of Digital Design Australia's Extending Grasshopper course.
Readings:	http://idda.com.au/ Tedeschi, A. (2014) Algorithms-Aided Design – Parametric Strategies using Grasshopper, Edizioni Le Penseur.
Tutorial activities:	Using the potential terminal lines identified in last week's independent study create your first grasshopper script for pavilion versions 1-3. Integrate the real time grasshopper to UE4 components to stream design iterations through to UE4 for evaluation in first person.
Independent Study:	Capture images of each pavilion version from multiple angles to create a composite image that integrates the parameters you are varying and the impact it is having on that version. Write a 50-100 word statement describing the distinctiveness and significance of your design.
Week 6 Topic **1 September.**	**Introduction to Emergence (Giulia Conti)** This lecture introduces the concept of "Emergence". Sub topics include: Computation vs Computerization, Emergence and Self-Organization, Emergent Behaviours and Collective Intelligence, Case studies from the animal realm (Swarm Systems, Ant Colony, Termites Cathedrals, Slime-Mold Aggregation) and Case studies from Art, Architecture and Cinema.
Readings:	Tedeschi, A. (2014) Algorithms-Aided Design – Parametric Strategies using Grasshopper, Edizioni Le Penseur.
Tutorial activities:	Using the concept of emergence create your second grasshopper script for pavilion versions 4-6. Integrate the real time grasshopper to UE4 components to stream design iterations through to UE4 for evaluation in first person. Capture images of each pavilion version from multiple angles to

	create a composite image that integrates the parameters you are varying and the impact it is having on that version.
Independent Study:	Write a 50-100 word statement describing the distinctiveness and significance of your design. Learning Step 2 Extending Grasshopper (Exam to be completed and result uploaded by 23:59 on 13 September) 5%

Week 7 Topic **8 September**	**Software Interoperability and Data in Design as Mobility (Andrew Butler)** This lecture uses the theme of Mobility to contextualise ideas around software interoperability and potential flows of data.
Readings:	Tedeschi, A. (2014) Algorithms-Aided Design – Parametric Strategies using Grasshopper, Edizioni Le Penseur.
Tutorial activities:	Responding to the theme of Mobility create your third grasshopper script for pavilion versions 7-9. Integrate the real time grasshopper to UE4 components to stream design iterations through to UE4 for evaluation in first person.
Independent Study:	Capture images of each pavilion version from multiple angles to create a composite image that integrates the parameters you are varying and the impact it is having on that version. Write a 50-100 word statement describing the distinctiveness and significance of your design.

Week 8 Topic **15 September**	**Phase 3 Introduction: The Residence.** This lecture introduces the primary private element of the design; a single family residence. Deliverables for this phase include; 1 UE4 project folder, 1 Pavilion with revisions to suit 1 Domestic Residence, 1 x 3 minute (max) short film, 5 x stills from the UE4 environment, 1 x final grasshopper script (with comprehensive comments), 1 x 3dsmax model of the architectural precedent, 3 x 3dsMax models of the modified precedent.
Readings:	Raumplan versus Plan Libre. Adolf Loos and Le Corbusier, 1919 -1930 edited by. Max Risselada with contributions by. Beatriz Colomina. Stanislaus von Moos. Available online here: http://repository.tudelft.nl/assets/uuid:e613a1d6-403b-476b-828d-3340f275c74f/0696-1421.pdf 1 Minute startup videos to begin your 3dsMax training http://download.autodesk.com/us/3dsmax/skillmovies/index.html?movie=getstarted&lang=en&auto Modelling a building using Boolean Operations: http://help.autodesk.com/view/3DSMAX/2015/ENU/?guid=GUID-59201133-BFA1-48DA-9DBA-CA6665C17A33 For correct lighting/shadowing models need to have a second UV channel that is unwrapped so that there are no overlapping coordinates; these tutorials are the best I've found on a topic that

	can be confusing for beginners: Part 1: https://www.youtube.com/watch?v=oYW0y8y2hk0 Part 2: https://www.youtube.com/watch?v=LDKUkqTKt80 Part 3: https://www.youtube.com/watch?v=LDKUkqTKt80 Part 4: https://www.youtube.com/watch?v=hjwxXh5VxeQ Part 5: https://www.youtube.com/watch?v=ouHLM490rL4 Part 6: https://www.youtube.com/watch?v=furPjB6S-0w Part 7: https://www.youtube.com/watch?v=hqGZ8M9b7EE Part 8: https://www.youtube.com/watch?v=8t1QclNa7ns Part 9: https://www.youtube.com/watch?v=iPcDyTb4ZhY Part 10: https://www.youtube.com/watch?v=vCcx-0X--H0 It's very important to get this right, so it's worthwhile to watch all of the videos above; this link explains why it's so important https://docs.unrealengine.com/latest/INT/Engine/Content/Types/StaticMeshes/LightmapUnwrapping/index.html
Tutorial activities:	Choose a precedent residence from either Adolf Loos or Le Corbusier and create a model of it using 3dsMax.
Independent Study:	Complete the full set of tutorials above and finish the building of your precedent model by the beginning of week 10. Take special care not to add unnecessary detail with geometry; in other words use texture application to replicate detail at fine scale.
Week 9	**Study Week**
	Mid Semester Break
Week 10 Topic **06 October.**	**Computation and the Real World (Giulia Conti)** This lecture uses a series of case studies to discuss various concepts, limits and restraints faces in professional practice. It also demonstrates real world application of algorithmic design through the grasshopper plugins: Kangaroo, TT-Toolbox, Excel Loop and others.
Readings:	Modelling a building using Modifiers: http://help.autodesk.com/view/3DSMAX/2015/ENU/?guid=GUID-4027D03A-C5C9-4819-B7BC-9D3C75F4788A
Tutorial activities:	Complete the tutorial above and use the Twist, taper and FFD modifiers to adjust the model you created in week 8.
Independent Study:	Using the modifier techniques above create 3 distinct versions that reflect the new public/private context found at the buildings new site.
Week 11 Topic **13 October.**	**Guest Lecture (TBC)** Computer gaming and other contemporary technologies from an Engineering perspective.
Readings:	TBA.
Tutorial activities:	Revise the Pavilion to incorporate the 3 residential options

	created in week 10.
Independent Study:	Complete the revisions above in preparation for evaluation in week 12.
Week 12 Topic	**Guest Lecture (TBC)**
20 October.	Computer gaming and other contemporary technologies from a Game Design perspective.
Readings:	TBA.
Tutorial activities:	The three options created last week will be evaluated by your peers in this tutorial; you will follow a quantitative method.
Independent Study:	Develop the selected scheme through to a high level of resolution for the final submission.
	Please complete the CATEI feedback evaluations in your tutorial class.
Week 13 Topic	**Future Directions: "Where to from here?"**
27 October	This lecture examines pathways for students to employ their newly gained knowledge in the modification of computer gaming technology. In addition to direct applications within their degree program this lecture examines case studies from new platforms such as Kickstarter, the thinking of leading futurologists, leading academic institutions and the world of science fiction.
Readings:	TBA; the most relevant readings might not even exist at the time of this documents writing!
Tutorial activities:	Individual meetings with tutors to receive the final pre submission critique.
Independent Study:	Complete all deliverables by the final submission date.
Week 15	**PARITY SESSION of all courses in the semester**
	Presentation of all work of all courses. THIS IS ONLY COMPULSORY FOR CODE PROGRAM STUDENTS via a selection of the five best images with descriptions presented one poster for each course. Hand in on Wednesday in Week 15 before 1 pm at the DD unit on Level 4. See Parity Session for detailed information.
Online Learning:	N/A
Tutorial activities:	Parity session hand in at Wednesday week 1 prior to 1pm at DD unit.
	Parity session set up for Year 1 students from 9 – 10pm;
	Parity session for tutors with compulsory students attendance between 10 – 1pm;
	Take down of work Year 1 from 1 pm onwards.
	Parity session set up for Year 2 students from 1 – 3pm;
	Parity session for tutors with compulsory students attendance between 3 – 5pm;
	Take down of work Year 2 from 5 pm onwards, followed by drinks.

6. Design Project

Through 3 phases students will design a small scaled hybrid public/private space.

The site is a real location in the Sydney suburb of Woolloomooloo. Woolloomooloo is a place of contrasts and oppositions; as real estate values soar the very affluent come into direct contact with the very poor. Opulent homes on the one hand, homelessness on the other.

The brief for this design project calls for a pavilion that offers some kind of public shelter. It should also provide bathing facilities and lockers for people to store their belongings while bathing. The pavilion should link the public thoroughfares that boarder the three sides of the site with the low income housing on the fourth boundary.

To provide for peoples safe and productive use of the pavilion facilities there will be an onsite caretaker. His/her residence should accommodate their small family. Their residence should shelter them from the potentially noisy use of the public space that surrounds their home. A transition from public to private is assumed in terms of traffic, visual and acoustic variables.

To begin the project students will represent quantitative data they gather that relates to the site and its surroundings. In this way data becomes the foundation of their project.

7. Design Project Site

Material relating to the site is available on the BE courses drive here:

S:\CODE1240\Resources\SiteInformation

Or \\coursefolders.fbe.unsw.edu.au\DATA\CODE1240\Resources\SiteInformation if you are off campus

You will find plans, sections, contours and information relating to governmental regulation.

7. Online teaching

Whereas traditionally software was and still is taught in most universities in a classroom environment CoDe applies a flipped classroom strategy to communicate software skills. We believe that 1:1 tutorial time is too precious to use on outlining simple commands one can learn remotely. We emphasise an importance of getting feedback in the classroom on design specific issues and very specific software issues but not a general overview.

Thus the online component of this class consists of the following two learning steps:

Learning Step 1:

The independent online teaching component of the course concentrates primarily on two pieces of software with two delivery methods. This first is learning to modify the Unreal Engine 4 by following video tutorials hosted on the Unreal Engine channel on YouTube. Each week you will be given a set of tutorials to complete. The second involves following an online course for Advanced Grasshopper offered by IDDA (Institute for Digital Design Australia). In this course students have the opportunity to follow the step-by-step online video tutorials and consequently learn the software. The course is structured in smaller segments in which students can gain skills. At the end of the learning level the online teaching provider IDDA has offered an exam to assess your skills in the software. This exam is compulsory to pass by the end of Design Phase 2.

Learning Step 2:

There are and will be always issues or points where one get either confused when learning new skill or will, at some stage, hit a barrier. Whereas traditionally this barrier could have been overcome by forming study groups amongst students situated at the same space at the same time, online platforms can take now this role and liberate students from travelling for long distances to meet in study groups. Thus each student has access to an online platform in which issues and problems with either of the software can be discussed. The class forum will provide a platform for

students to upload questions on the one hand as well as a platform to answer questions from other students.

Thus learning of new software skills has following three steps:

- First learning through online video tutorials
- Second asking and debating questions between students via the online forum
- Asking specific and primarily design related questions in the tutorials in class.

Following and participating in these three steps within a flipped classroom model will contribute significantly to your learning at CoDe.

8. Assessment

Assessment task	Weight	Learning outcomes assessed	Due date
Assignment 1: The Site	20%	1, 5	16 August by 23:59.
Assignment 1: The Pavilion	30%	3, 5	13 September by 23:59.
Assignment 1: The Residence	40%	1, 2, 3, 4, 5	17 November by 23:59
Assignment 2: Learning Step 1	5%	2, 3, 5	6 September by 23:59
Assignment 2: Learning Step 2	5%	2, 3, 5	13 September by 23:59.
Assignment 3: "Best of Semester" Parity and Moodle Submission	*)	1, 2, 3, 4, 5	W 15

*) No weight but overall mark will be reduced by 10% if not handed in on time

Assignment 1 / Learning Step 1: The Site (20% of mark)	
Name:	Phase 1: The Site
Description:	Timetable: 28 July – 16 August Site: Cnr of Dowling Street and Reid Avenue, Woolloomooloo Software: UE4 Techniques: BSP, Terrain Modelling, Particle Systems Assessable Outputs: 1 UE4 project folder, A comprehensive site model of the address above and the surrounding area (including terrain, roads and surrounding buildings), 1 x 90 second video animation showing a particle system representing quantitative data that has links to the site. Premise: That quantitative data analysis and representation can be the foundation of architectural design.

Assignment 1 / Learning Step 2: The Pavilion (30% of mark)	
Name:	Phase 2: The Pavilion
Description:	Timetable: 18 August – 13 September Site: Cnr of Dowling Street and Reid Avenue, Woolloomooloo. Software: UE4, Rhino, Grasshopper. Techniques: Real Time Data Streaming, Advanced Grasshopper, Grasshopper Plugins, Migration. Assessable Outputs: 1 UE4 project folder, 9 Public Pavilions representing 3 distinct scripts, 9 sets of parameters, a passing grade in the IDDA Advanced Grasshopper course. 3 x 50-100 word statements describing the distinctiveness and significance of your designs. Premise: That computation supports iteration and iteration supports successful design.

Assignment 1 / Learning Step 3: The Residence (40% of mark)	
Name:	Phase 3: The Residence
Description:	Timetable: 15 September - Site: Cnr of Dowling Street and Reid Avenue, Woolloomooloo Software: UE4, Rhino, Grasshopper, 3dsMax Techniques: Real Time Data Streaming, Advanced Grasshopper, Grasshopper Plugins, 3dsMax modelling, UVW Unwrapping and Mapping. Assessable Outputs: Deliverables for this phase include; 1 UE4 project folder, 1 Pavilion with revisions to suit 1 Domestic Residence, 1 x 3 minute (max) short film, 5 x stills from the UE4 environment, 1 x final grasshopper script (with comprehensive comments), 1 x 3dsmax model of the architectural precedent, 3 x 3dsMax models of the modified precedent. Premise: That deformation, tension and negotiation can be positive attributes of multiprogram/mixed use developments.

Assignment 2 (online) TOTAL 10%

The online assignment compromises to learn two software programs, Grasshopper and Rhino. In order to learn these two programs we apply a flipped classroom strategy where the software is learned via online video tutorials and the skills are tested via exams (See 7. Online Teaching). Consequently the assignment in the online section is the completion of the exams provided by IDDA (Institute for Digital Design Australia). The IDDA is an independent organisation that has developed teaching and learning tutorials to learn Rhino and Grasshopper via small video tutorials. Each tutorial has a specific topic that explains in small steps the essentials and background in the project.

Name:	Learning Step 1 **Grasshopper Advanced** (Exam to be completed and result uploaded by 6 September by 23:59) 5%

Description:	The assignment is defined by IDDA (http://idda.com.au/thecourses/). Any late hand in will result in a Zero for the Learning Step. See above for further information.
Name:	Learning Step 2 **Extending Grasshopper** (Exam to be completed and result uploaded by 13 September by 23:59.) 5%
Description:	The assignment is defined by IDDA (http://idda.com.au/thecourses/). Any late hand in will result in a Zero for the Learning Step.See above for further information.

Assignment 3	
Name:	Parity / Moodle submission
Description:	**For Moodle Submission:** Please refer to 18. Parity Session for information about what to hand in and 4. Course Website for how to upload. For Parity Submission: Please refer to 18. Parity Session for information on what to present and to 5. Lecture when to present in Week 15.

9. Assessment criteria and standards

Assignment 1 / Learning Step 1								
CODE1240 Real-Time Environments								
The Site								
STUDENT NAME:								
The numbers below are indicative only, 5 is Higher than 1								
#	Assessment Criteria:		1	2	3	4	5	
1	Are the human made elements of the site accurately modelled?							
2	Is the landform of the site accurately modelled?							
3	Does the documentation of the students research describe a series of distinctive and significant quantitative parameters?							
	Are those parameters represented rigorously using the UE4 particle system?							
OVERALL GRADE:								
FEEDBACK:								

Assignment 1 / Learning Step 2

CODE1240 Real-Time Environment

The Pavilion

STUDENT NAME:	

The numbers below are indicative only, 5 is Higher than 1

#	Assessment Criteria:		1	2	3	4	5	
1	Has the student successfully completed the IDDA Grasshopper course?							
2	Are the three Grasshopper scripts distinctive?							
3	Are the three Grasshopper scripts well commented?							
4	Does the first Grasshopper script relate in some interesting way to Preston Scott Cohens theory of the Terminal Line?							
5	Does the second Grasshopper script relate in some interesting way to the concept of Emergence?							
6	Does the third Grasshopper script relate in some interesting way to the theme of Mobility?							
7	Do the composite images document the pavilions and how the parameters are impacting on them well?							
8	Is the short statement a clear, evocative and professional piece of writing?							
OVERALL GRADE:								

FEEDBACK:

Assignment 1 / Learning Step 3

CODE1240 Real-Time Environment

The Residence

STUDENT NAME:

The numbers below are indicative only, 5 is Higher than 1

#	Assessment Criteria:		1	2	3	4	5	
1	Is the precedent architecture accurately modelled?							
2	Has the student taken care not to create unnecessary geometry?							
3	Are the three modified precedents distinctive?							
4	Do the three modified precedents reflect the new site conditions?							
5	Has the Pavilion been well modified with respect to the siting and geometric impact of the Residence?							
6	Does the final Grasshopper script include comprehensive and useful comments?							
7	Do the five stills represent, or extend, the scheme well?							
8	Does the 3 minute short film represent, or extend, the scheme well?							
OVERALL GRADE:								

FEEDBACK:

10. Assessment feedback

Students will gain information about their process in class via 3 basic levels.

Firstly, The goals of the class are clearly defined in the course outline and discussed at the beginning of each Assignment and the learning steps within the assignment in the weekly lecture. Here students will understand how their performance relates to the broad goals of the course.

Secondly, students will get feedback in each class (during the three tutorial hours) upon their performance. Tutors will help students in one-to-one sessions to discuss and analyse how successful they have been at addressing the task and its criteria of each assignment and the learning steps within the assignment.

Thirdly, students will get feedback in each class (during the three tutorial hours) on how their response to the assignment and the learning steps within the assignment could be improved. Tutors will help students in one-to-one and small group sessions to discuss and analyse how improvements could be made and which resources students could consult to assist in their process.

11. Resources

11.1 Readings, textbooks and UNSW Library resources

Essential readings

"Richard Goodwin: Performance to Porosity" Craftsman House, 2006 ISBN: 0975768425

"Terminal Lines", Architecture and Urbanism (A&U), Tokyo, Feb. 2000

Raumplan versus Plan Libre. Adolf Loos and Le Corbusier, 1919 -1930 edited by. Max Risselada with contributions by. Beatriz Colomina. Stanislaus von Moos.

11.2 Online resources

Learning resources

- Massive UE4 Tutorial Playlist: https://www.youtube.com/playlist?list=PLZlv_N0_O1gaCL2XjKluO7N2Pmmw9pvhE
- The written tutorials below are a good refresher once your watched the video tutorials above (focus, especially, on the "Level Designer Quick Start" and "Artist Quick Start" sections): https://docs.unrealengine.com/latest/INT/GettingStarted/index.html?utm_source=uelauncher&utm_medium=software&utm_campaign=learntab
- Institute for Digital Design Australia: www.idda.com.au
- Raumplan vs Plan Libre download: http://repository.tudelft.nl/assets/uuid:e613a1d6-403b-476b-828d-3340f275c74f/0696-1421.pdf

Social network resources

UNSW CoDe has a Twitter, Instagram, Facebook and Youtube account and all lecturers will be using these accounts to share information with their students. Please join and follow us on @UNSWCoDe (for all above listed networks) we will use "UNSW" + "CODE" + the course number as a hash tag to help finding the relevant info (for this course #UNSWCODE1240). Feel also free to post images of your design on social media using the hash tag.

11.2 Class requirements

Studio class requirements

It is expected that you will bring your laptop with the below mentioned software packages to each class. Not bringing a laptop means we cannot look, comment and help you with your work, as we do not run this class in a computer classroom. Using your friend's laptop means that he or she cannot work in the time given in class and thus is not an option either.

Software and hardware requirements

UE4 and Grasshopper for Rhino (with various plugins). 3dsmax. See the respective software developers websites for hardware recommendations.

11.3. Grasshopper resources

All images and Grasshopper files are developed and posted in the homepage (http://atlv.org/education/grasshopper/) by ATLV.org. It is accepted that the GH files on the homepage are used for your design as a form of typology to develop a design but a bare copy and paste exercise without further development or adaptation of the script is not accepted. Use them as a source of inspiration in the same manner would study a design by a famous architect – you would only study it and apply principles but not copy and paste the design and claim that it is your own.

2D patterning

The first series of scripts deal with flat surfaces and how one can apply attractors (one or multi) to a surface. One does not need any further plugins as we do for the later scripts but only Grasshopper and Rhino fro visualising the scripts.

- Circle Field with One Attractor:

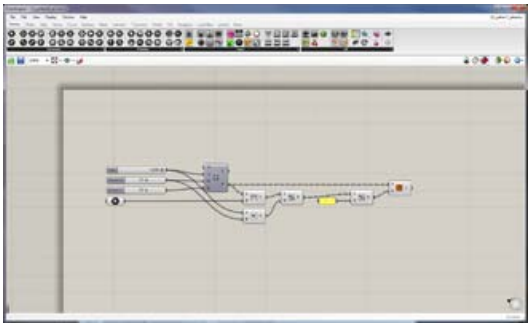

Image 1: Circle Field with One Attractor © http://atlv.org/education/grasshopper/

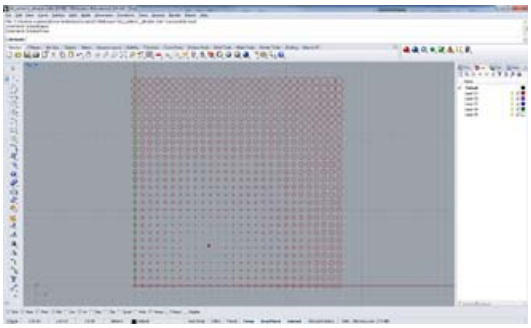

Image 2: Circle Field with One Attractor © http://atlv.org/education/grasshopper/

- Circle Field with Two Attractor

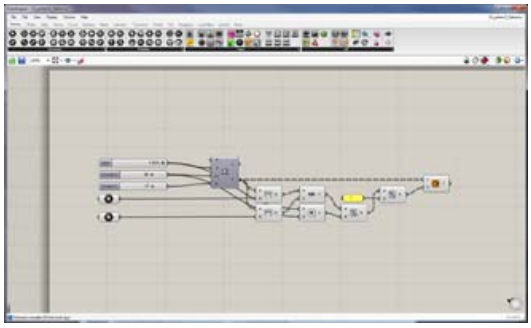

Image 3: Circle Field with Two Attractors © http://atlv.org/education/grasshopper/

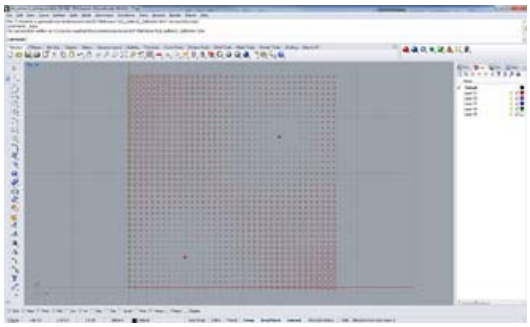

Image 4: Circle Field with Two Attractors © http://atlv.org/education/grasshopper/

- Circle Field with Multi Attractor

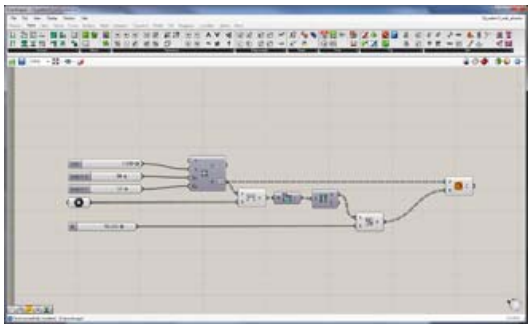

Image 5: Circle Field with Multi Attractors © http://atlv.org/education/grasshopper/

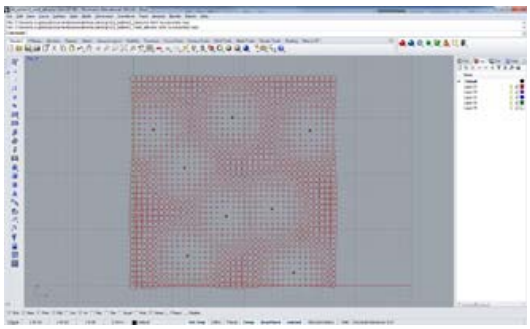

Image 6: Circle Field with Multi Attractor © http://atlv.org/education/grasshopper/

- Circle Field with Multi Attractors and Colours

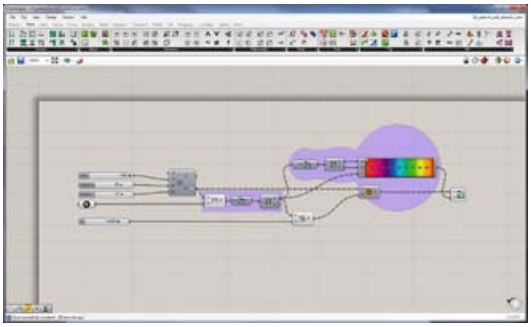

Image 7: Circle Field with Multi Attractors and Colours © http://atlv.org/education/grasshopper/

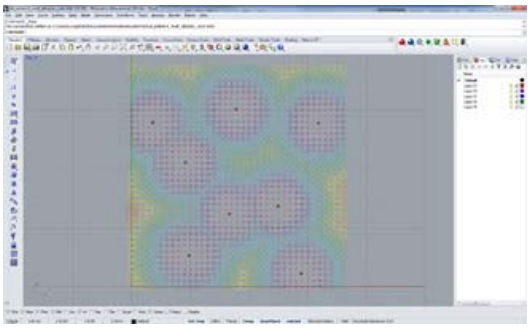

Image 8: Circle Field with Multi Attractors and Colours © http://atlv.org/education/grasshopper/

- Circle Field with Two Attractors and Graph Mapper

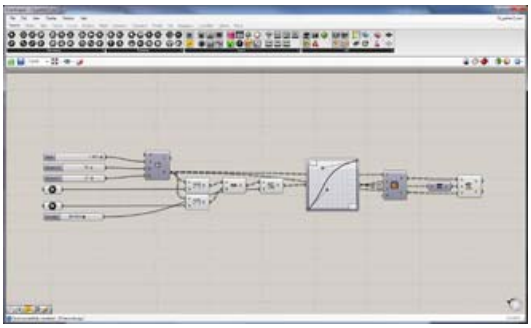

Image 9: Rectangle Field with Two Attractors and Graph Mapper © http://atlv.org/education/grasshopper/

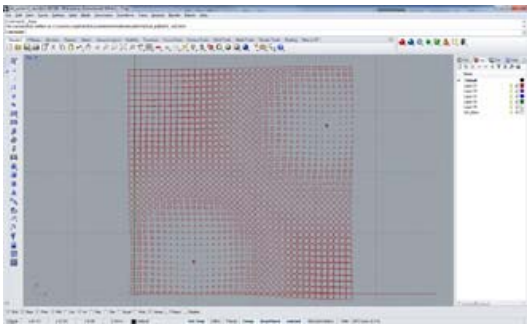

Image 10: Rectangle Field with Two Attractors and Graph Mapper © http://atlv.org/education/grasshopper/

- Custom Geometry Field with Two Attractors

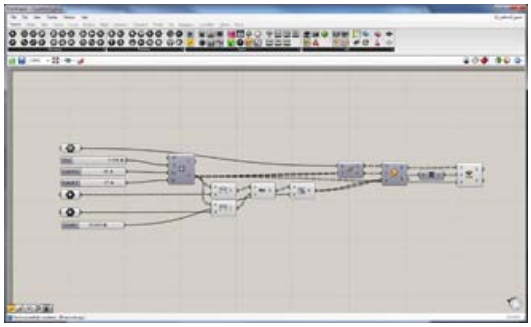

Image 11: Custom Geometry Field with Two Attractors © http://atlv.org/education/grasshopper/

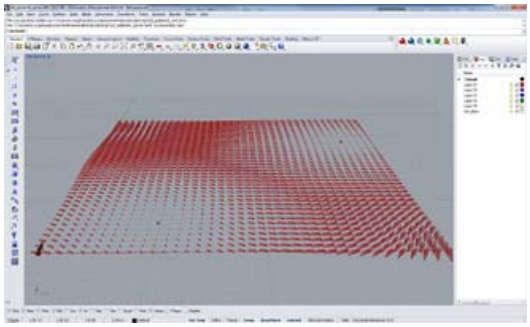

Image 12: Custom Geometry Field with Two Attractors © http://atlv.org/education/grasshopper/

- Custom Geometry Field by Array with Two Attractors

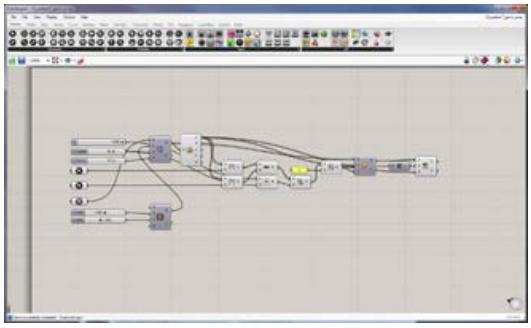

Image 13: Custom Geometry Field by Array with Two Attractors © http://atlv.org/education/grasshopper/

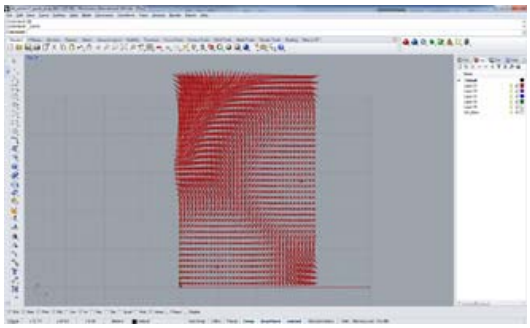

Image 14: Custom Geometry Field by Array with Two Attractors © http://atlv.org/education/grasshopper/

- Rectangle Field and Grouping

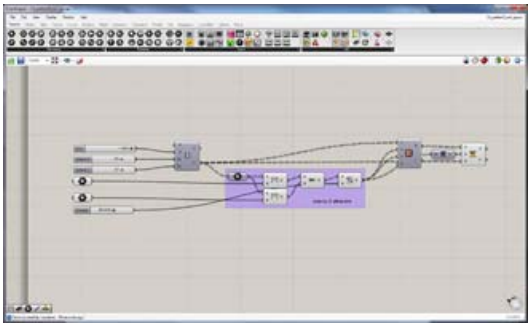

Image 15: Rectangle Field and Grouping © http://atlv.org/education/grasshopper/

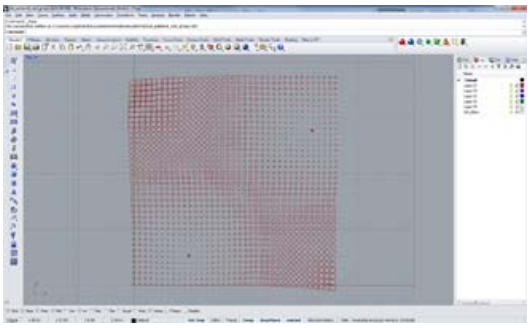

Image 16: Rectangle Field and Grouping © http://atlv.org/education/grasshopper/

- Rectangle Field and Clustering

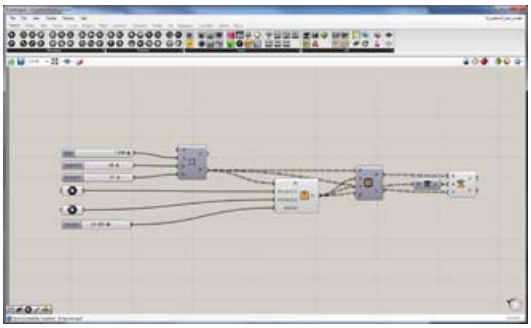

Image 17: Rectangle Field and Clustering © http://atlv.org/education/grasshopper/

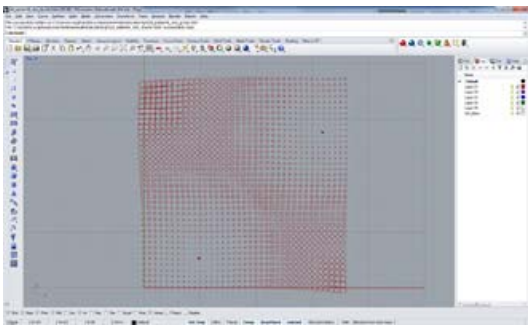

Image 18: Rectangle Field and Clustering © http://atlv.org/education/grasshopper/

- Rectangle Field and Multiparameters

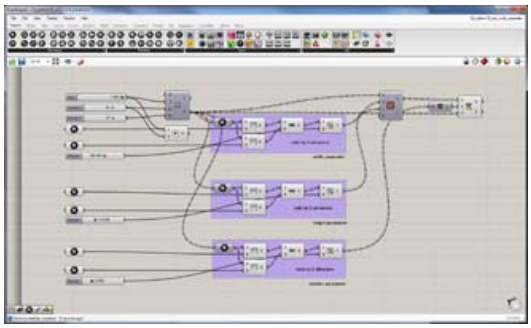

Image 19: Rectangle Field with Multi Parameters © http://atlv.org/education/grasshopper/

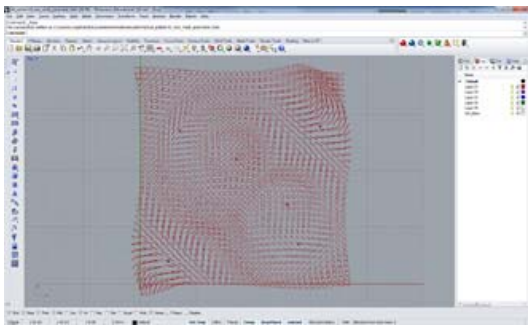

Image 19: Rectangle Field with Multi Parameters © http://atlv.org/education/grasshopper/

- Rectangle Field and Extrusion

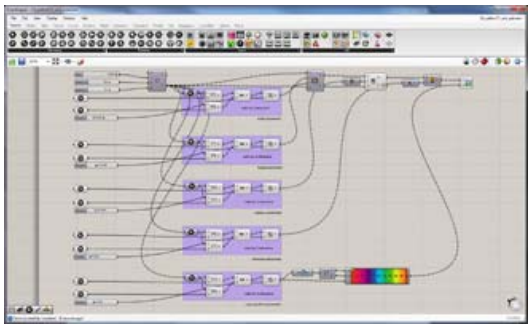

Image 20: Rectangle Field and Extrusion © http://atlv.org/education/grasshopper/

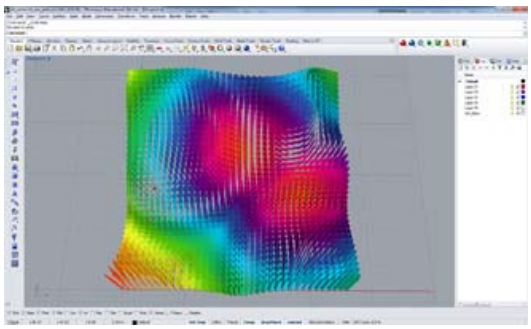

Image 21: Rectangle Field and Extrusion © http://atlv.org/education/grasshopper/

- Custom Geometry Field with Multi Parameters

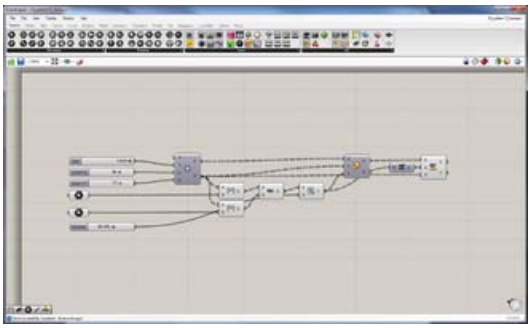

Image 22: Custom Geometry Field with Multi Parameters © http://atlv.org/education/grasshopper/

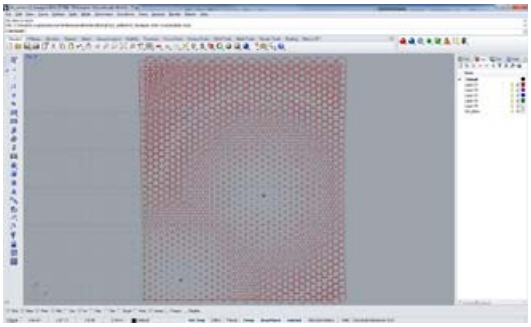

Image 23: Hexagon Field with Two Attractors © http://atlv.org/education/grasshopper/

- Hexagon Field with Two Attractors

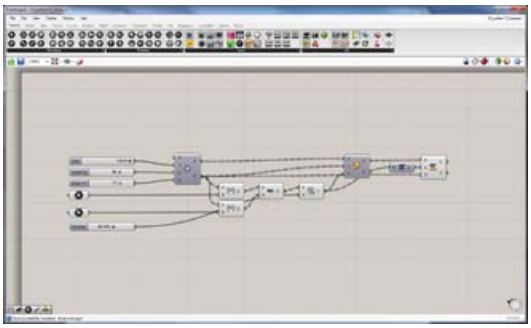

Image 22: Hexagon Field with Two Attractors © http://atlv.org/education/grasshopper/

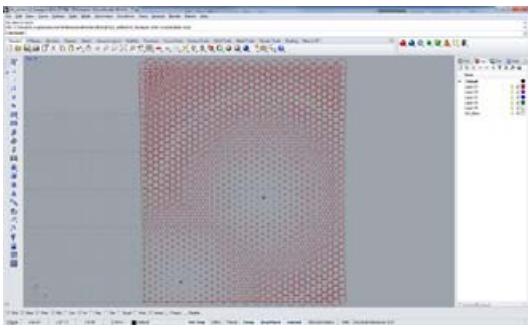

Image 23: Hexagon Field with Two Attractors © http://atlv.org/education/grasshopper/

- Custom Geometry Field with Multi Parameters

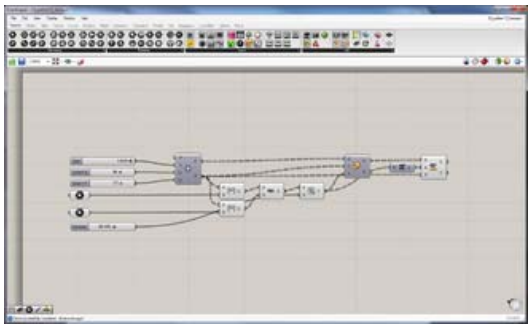

Image 24: Custom Geometry Field with Multi Parameters © http://atlv.org/education/grasshopper/

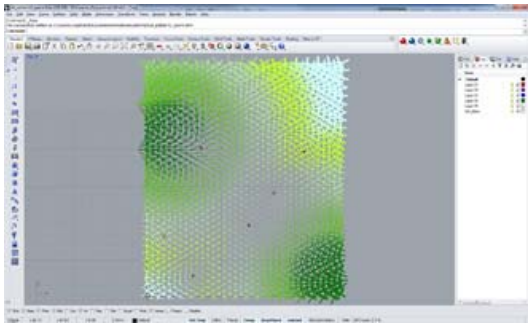

Image 24: Custom Geometry Field with Multi Parameters © http://atlv.org/education/grasshopper/

- Custom Geometry Field with Random 2D Distribution

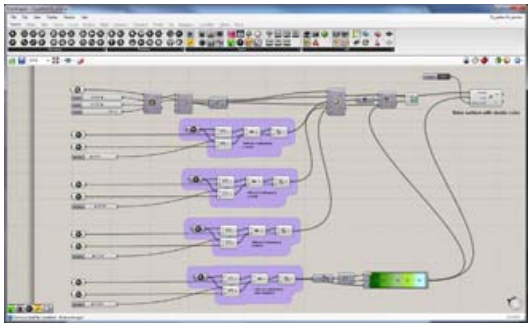

Image 25: Custom Geometry Field with Random 2D Distribution © http://atlv.org/education/grasshopper/

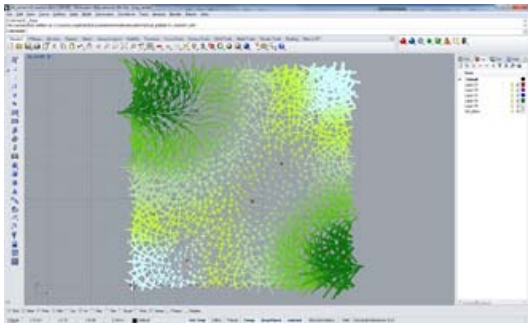

Image 26: Custom Geometry Field with Random 2D Distribution © http://atlv.org/education/grasshopper/

- Delaunay Field with Random 2D Distribution

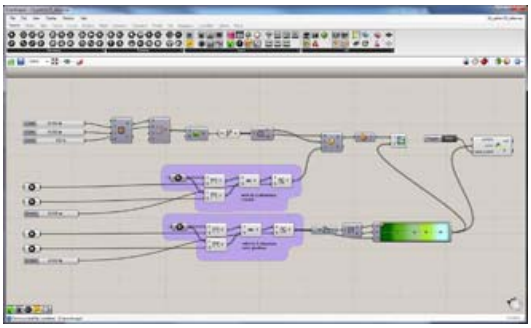

Image 27: Delaunay Field with Random 2D Distribution © http://atlv.org/education/grasshopper/

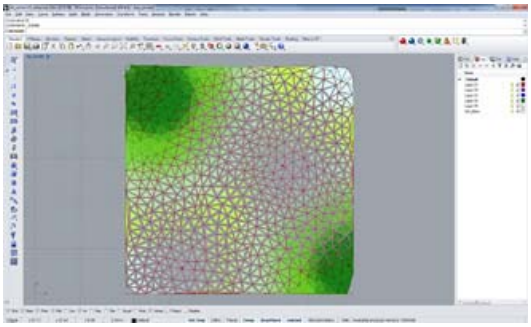

Image 28: Delaunay Field with Random 2D Distribution © http://atlv.org/education/grasshopper/

- Delaunay Field of Spline Outline with Random 2D Distribution

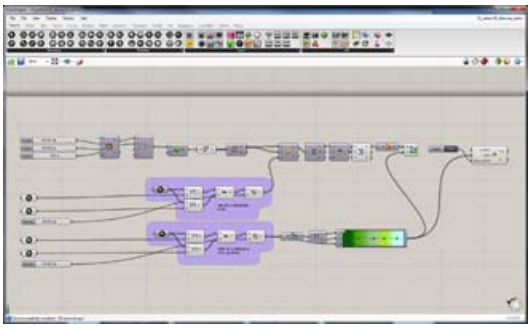

Image 29: Delaunay Field of Spline Outline with Random 2D Distribution © http://atlv.org/education/grasshopper/

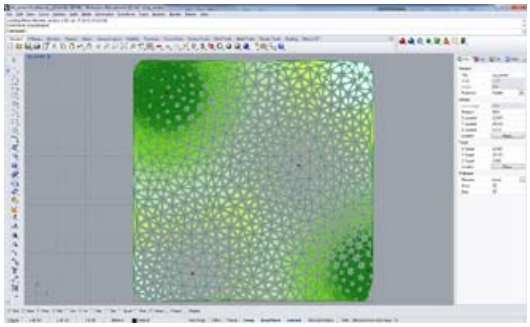

Image 30: Delaunay Field of Spline Outline with Random 2D Distribution © http://atlv.org/education/grasshopper/

- Voronoi Field with Random 2D Distribution

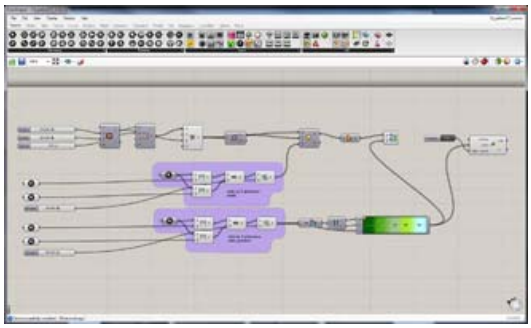

Image 31: Voronoi Field with Random 2D Distribution © http://atlv.org/education/grasshopper/

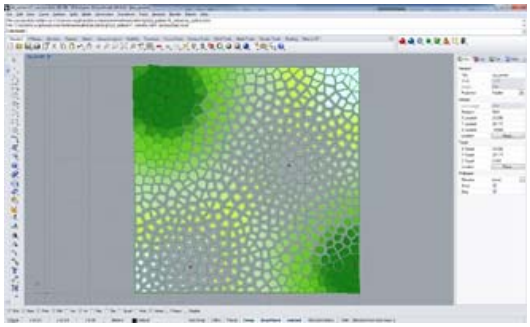

Image 32: Voronoi Field with Random 2D Distribution © http://atlv.org/education/grasshopper/

- Rectangle Field with Image Maps

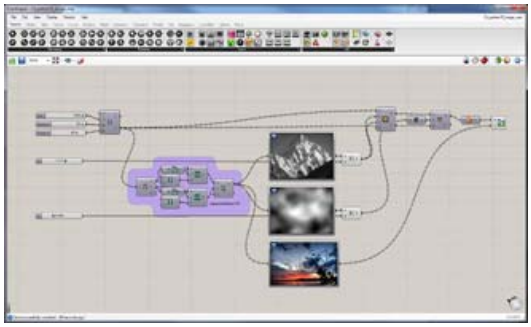

Image 33: Rectangle Filed with Image Maps © http://atlv.org/education/grasshopper/

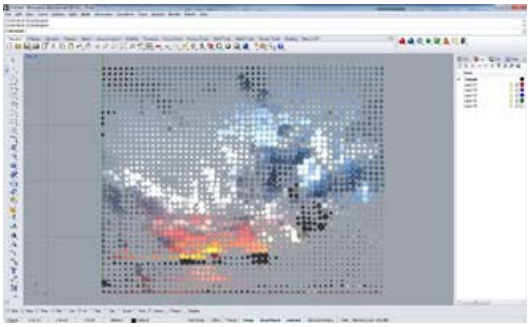

Image 33: Rectangle Filed with Image Maps © http://atlv.org/education/grasshopper/

Surface Mapping

The second series builds about upon the first and introduces a few more complexities.

- Simple Surface Division and Mapping

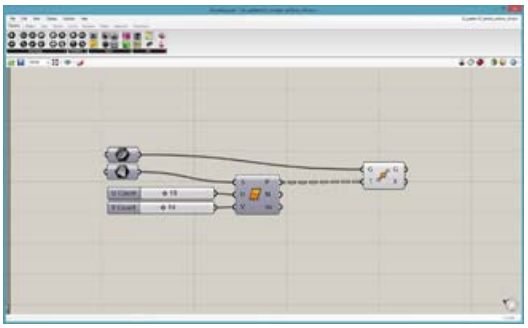

Image 1: Simple Surface Division and Mapping © http://atlv.org/education/grasshopper/

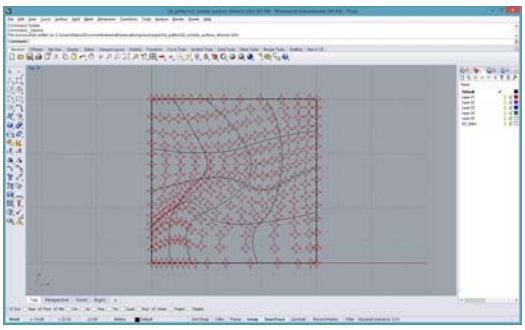

Image 2: Simple Surface Division and Mapping © http://atlv.org/education/grasshopper/

- Custom Curve Field by Surface Division

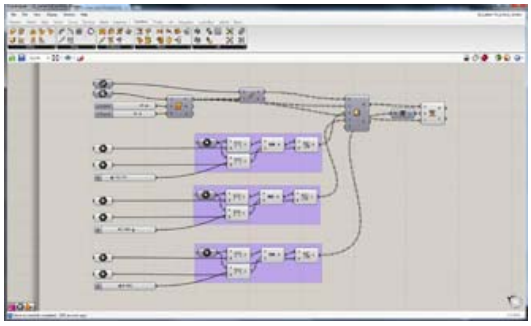

Image 3: Custom Curve Field by Surface Division © http://atlv.org/education/grasshopper/

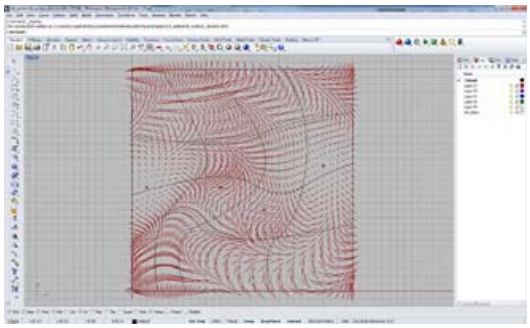

Image 4: Custom Curve Field by Surface Division © http://atlv.org/education/grasshopper/

- Rectangle Field Mapped on Surface

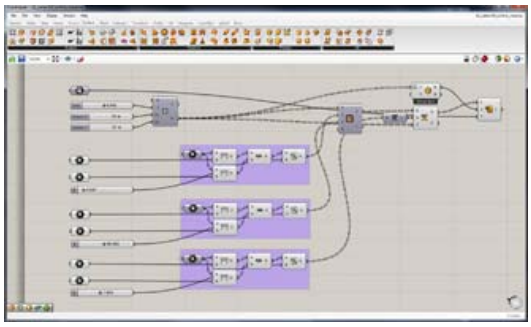

Image 5: Rectangle Field Mapped on Surface © http://atlv.org/education/grasshopper/

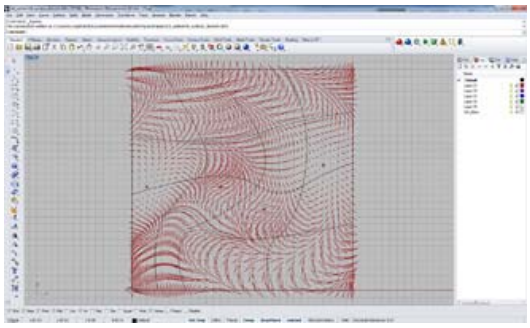

Image 5: Rectangle Field Mapped on Surface © http://atlv.org/education/grasshopper/

- Extrusion of Mapped Rectangles on Surface

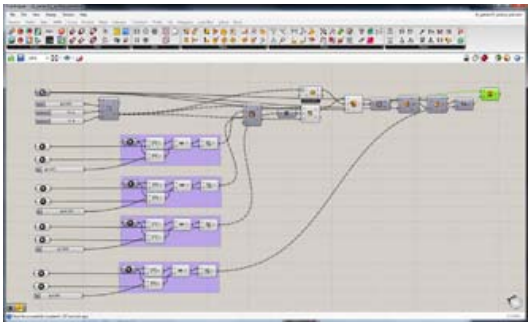

Image 6: Extrusion of Mapped Rectangles on Surface © http://atlv.org/education/grasshopper/

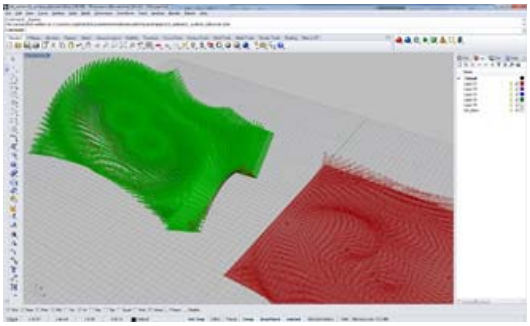

Image 7: Extrusion of Mapped Rectangles on Surface © http://atlv.org/education/grasshopper/

- Extrusion of Rectangles on Surface by Image Maps

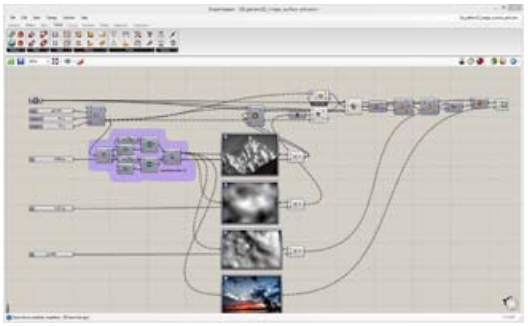

Image 8: Extrusion of Rectangles on Surface by Image Map © http://atlv.org/education/grasshopper/

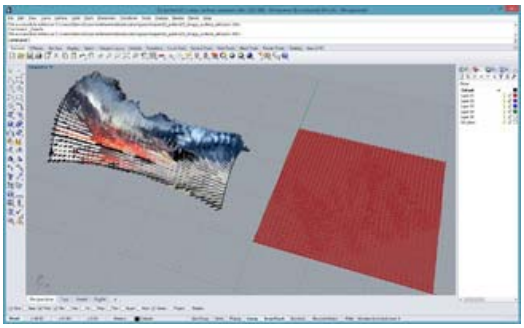

Image 9: Extrusion of Rectangles on Surface by Image Map © http://atlv.org/education/grasshopper/

- Trimming Surface by Voronoi Pattern

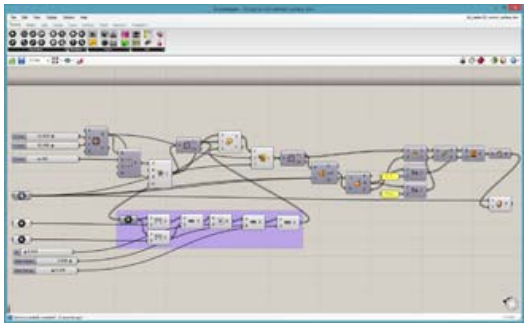

Image 10: Trimming Surface by Voronoi Pattern © http://atlv.org/education/grasshopper/

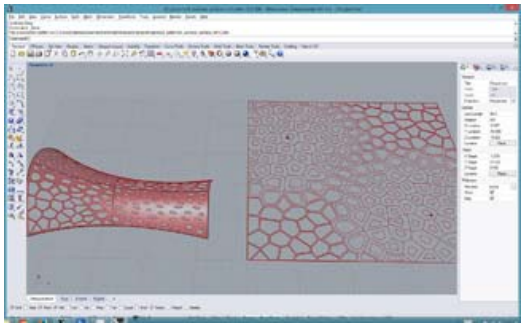

Image 11: Trimming Surface by Voronoi Pattern © http://atlv.org/education/grasshopper/

- Lofting Voronoi Patterns on Two Surfaces

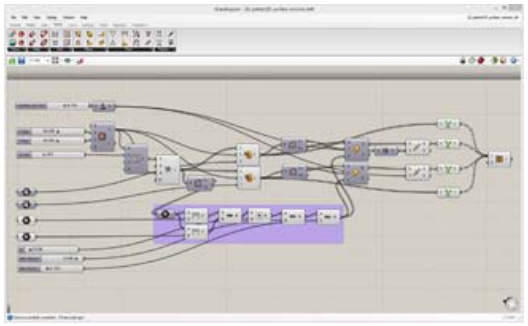

Image 12: Lofting Voronoi Patterns on Two Surfaces © http://atlv.org/education/grasshopper/

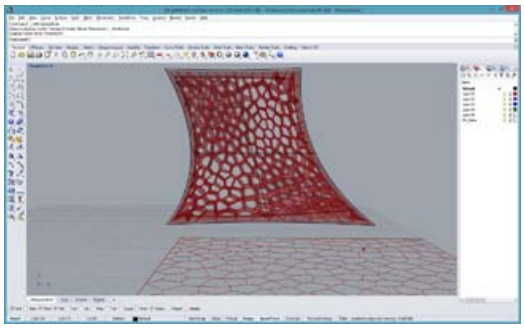

Image 13: Lofting Voronoi Patterns on Two Surfaces © http://atlv.org/education/grasshopper/

LunchBox and Panelization

Where as all scripts up to this point used Grasshopper only the following scripts are more advanced and use a plugin called 'LunchBox' editor. The plugin LunchBox editor, as all other plugins shown here is available on a homepage called 'Food 4 Rhino' (http://www.food4rhino.com/?ufh). Use this link for the 'LunchBox Editor': http://www.food4rhino.com/project/lunchbox?ufh

- Attractor and Attractor Wave

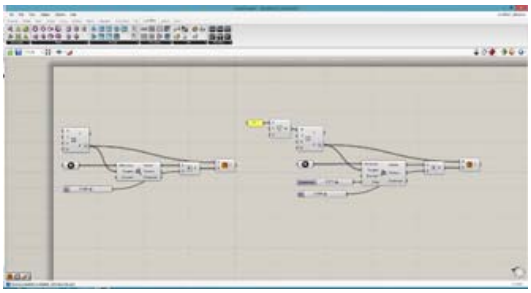

Image 1: Attractor and Attractor Wave © http://atlv.org/education/grasshopper/

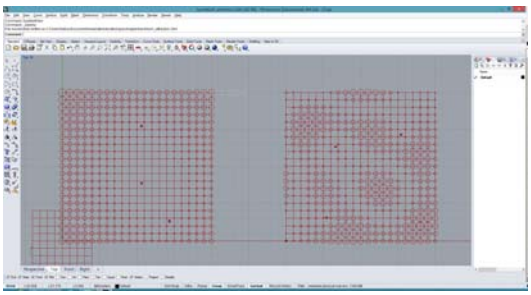

Image 2: Attractor and Attractor Wave © http://atlv.org/education/grasshopper/

- Orthogonal Grid Structure and Diagrid Structure

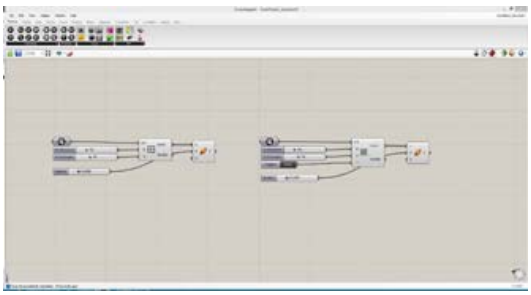

Image 3: Orthogonal Grid Structure and Diagrid Structure © http://atlv.org/education/grasshopper/

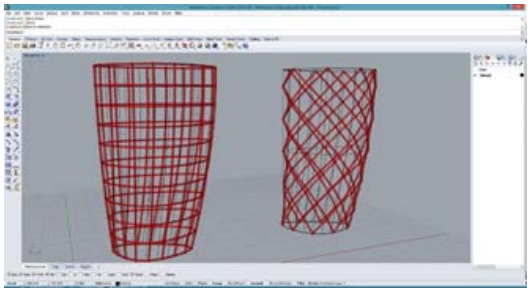

Image 4: Orthogonal Grid Structure and Diagrid Structure © http://atlv.org/education/grasshopper/

- Hexigonal Grid Structure and Space Frame

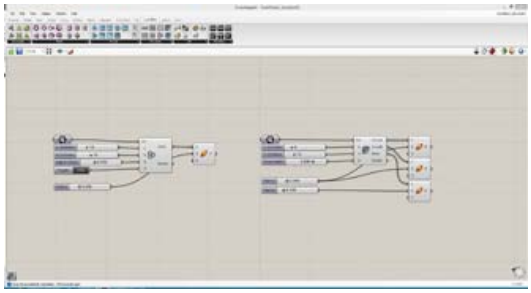

Image 5: Hexigonal Grid Structure and Space Frame © http://atlv.org/education/grasshopper/

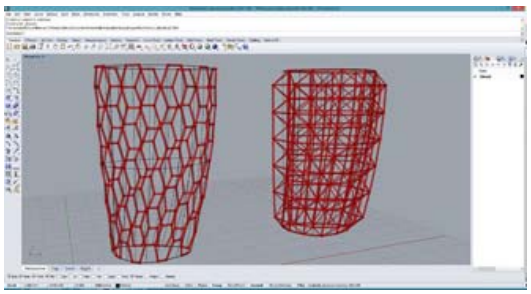

Image 6: Hexigonal Grid Structure and Space Frame © http://atlv.org/education/grasshopper/

- Quad and Staggered Quad Panelization

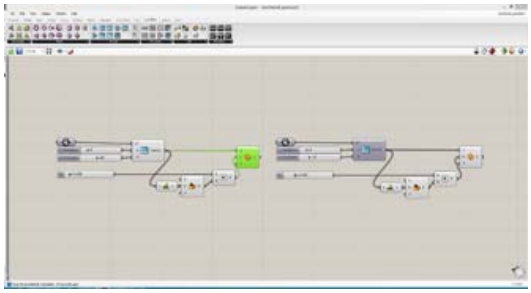

Image 7: Quad and Staggered Panelization © http://atlv.org/education/grasshopper/

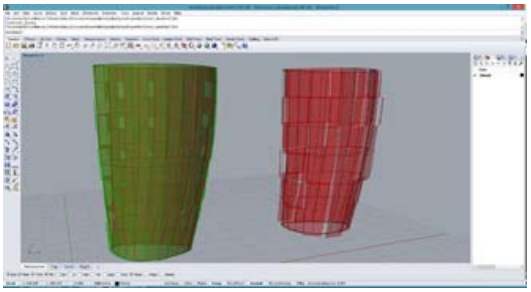

Image 8: Quad and Staggered Panelization © http://atlv.org/education/grasshopper/

- Diagrid and Hexiagonal Panelization

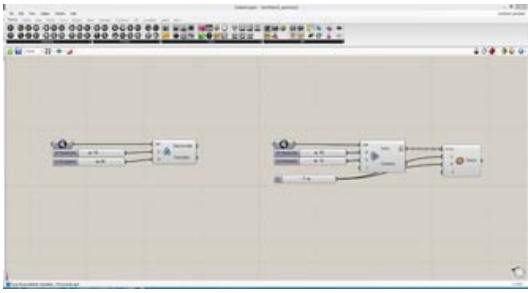

Image 9: Diagrid and Hexigonal Panelization © http://atlv.org/education/grasshopper/

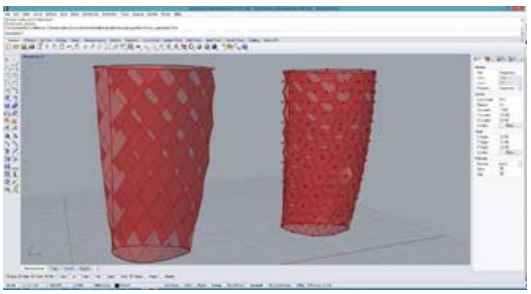

Image 10: Diagrid and Hexigonal Panelization © http://atlv.org/education/grasshopper/

- Random Quad and Triangular Panelization

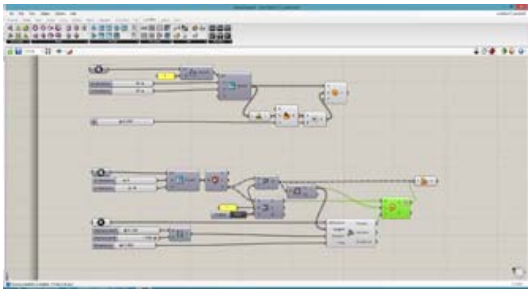

Image 11: Random Quad and Triangular Panelization © http://atlv.org/education/grasshopper/

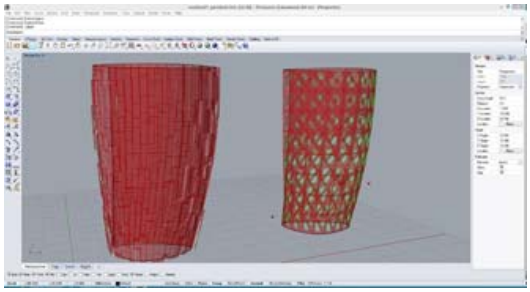

Image 12: Random Quad and Triangular Panelization © http://atlv.org/education/grasshopper/

- Panelization on Quad Grid 1

Image 13: Panaization on Quad Grid 1 © http://atlv.org/education/grasshopper/

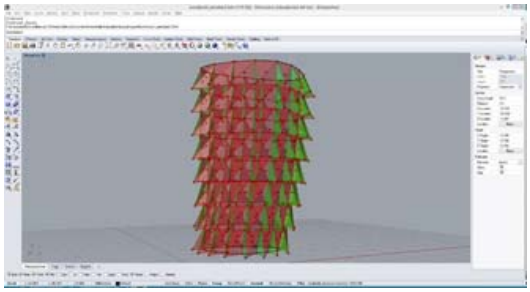

Image 14: Panelization on Quad Grid 1 © http://atlv.org/education/grasshopper/

- Panelization on Quad Grid 2

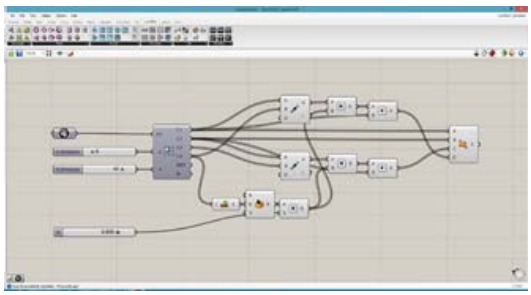

Image 15: Panelization on Quad Grid 2 © http://atlv.org/education/grasshopper/

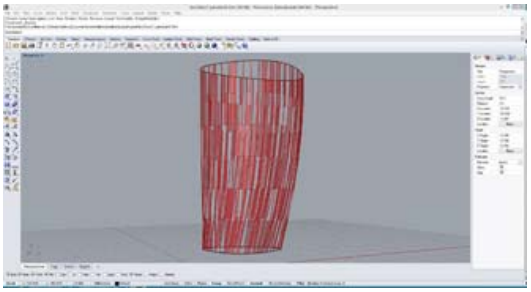

Image 15: Panelization on Quad Grid 2 © http://atlv.org/education/grasshopper/

- Panelization on Quad Grid 3

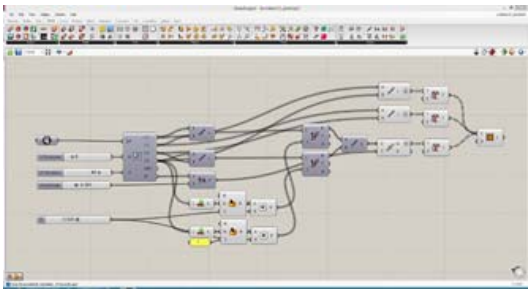

Image 16: Panelization on Quad Grid 3 © http://atlv.org/education/grasshopper/

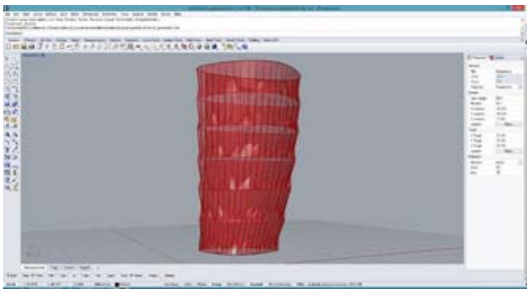

Image 17: Panelization on Quad Grid 3 © http://atlv.org/education/grasshopper/

- Panelization on Diamond Grid 1

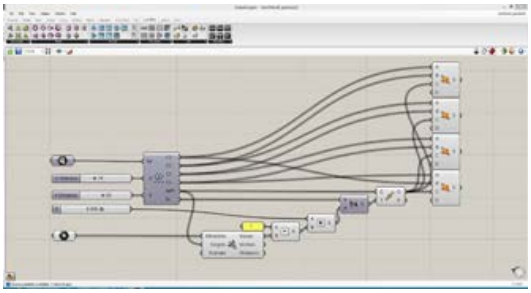

Image 18: Panelization on Diamond Grid 1 © http://atlv.org/education/grasshopper/

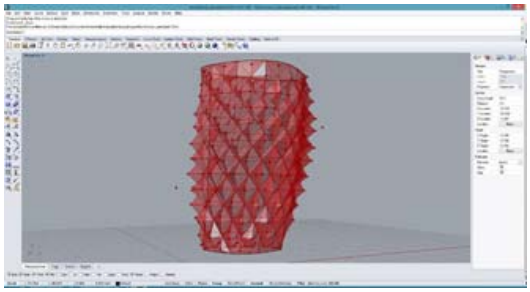

Image 19: Panelization on Diamond Grid 1 © http://atlv.org/education/grasshopper/

- Panelization on Diamond Grid 2

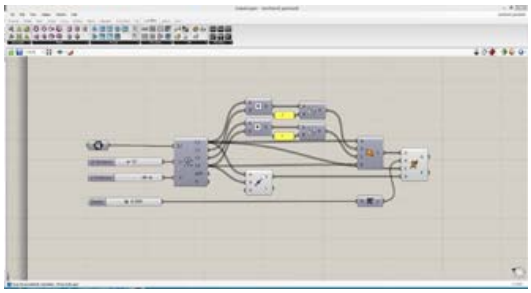

Image 20: Panelization on Diamond Grid 2 © http://atlv.org/education/grasshopper/

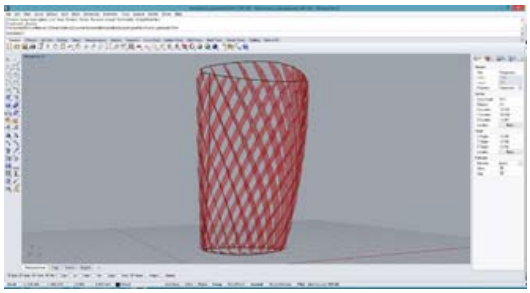

Image 21: Panelization on Diamond Grid 2 © http://atlv.org/education/grasshopper/

- Panelization on Diamond Grid 3

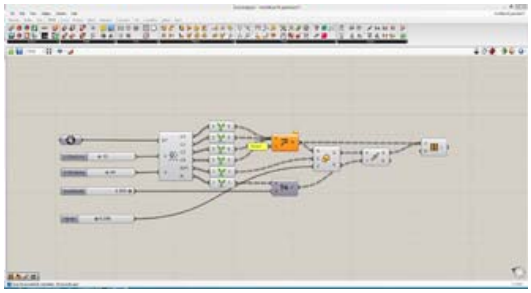

Image 22: Panelization on Diamond Grid 3 © http://atlv.org/education/grasshopper/

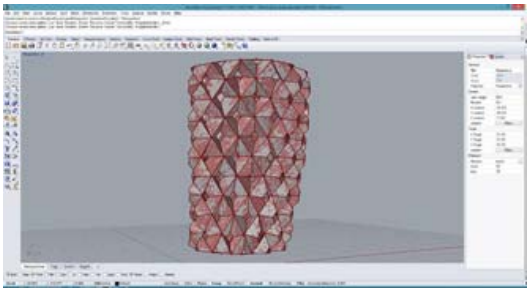

Image 23: Panelization on Diamond Grid 3 © http://atlv.org/education/grasshopper/

The last script in this series is a tower modelling exercise assuming your cylinder shape is a tower and the panels are your façade system.

- Tower Modelling Exercise

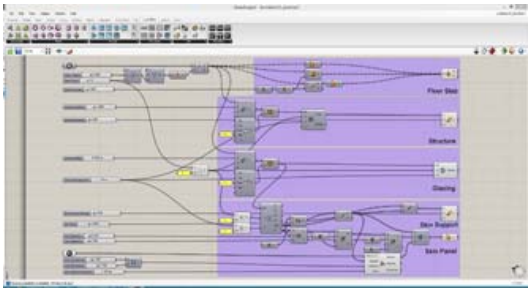

Image 24: Tower Modelling Exercise © http://atlv.org/education/grasshopper/

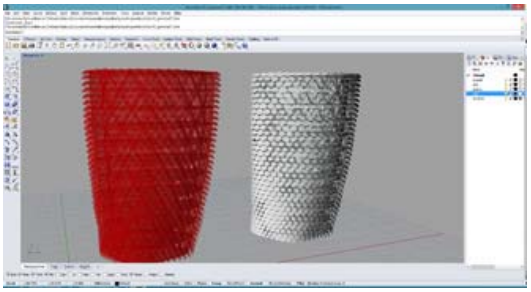

Image 25: Tower Modelling Exercise © http://atlv.org/education/grasshopper/

Data Structure – List and Tree

The organisation of data and being able to structure data is one of the main advantages of parametric software and design. The following scripts give examples of how data are structured via lists and trees. Please find more information about data structures in the compulsory reading materials of this course: Arturo Tedeschi's 'Algorithmic Aided Design'.

- Shifting List

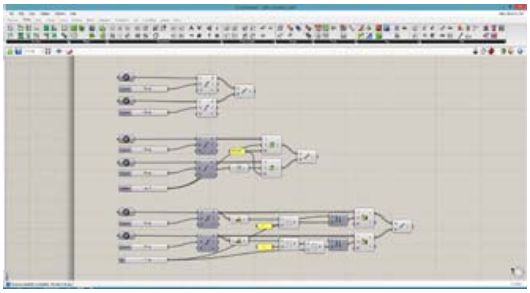

Image 1: Shifting Lists © http://atlv.org/education/grasshopper/

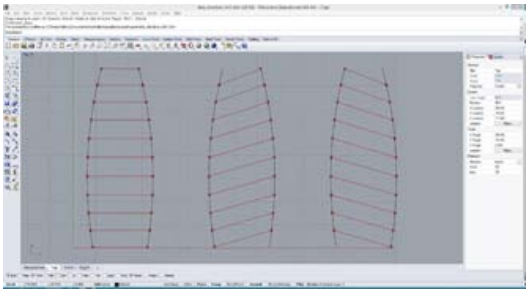

Image 1: Shifting Lists © http://atlv.org/education/grasshopper/

- Grafting List

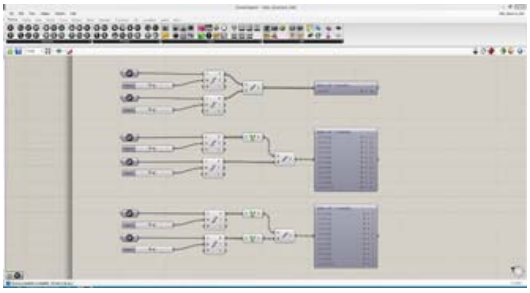

Image 3: Grafting List © http://atlv.org/education/grasshopper/

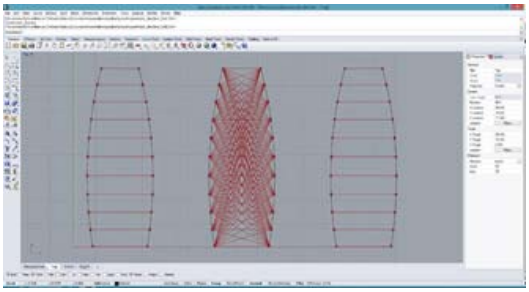

Image 4: Grafting List © http://atlv.org/education/grasshopper/

- Connecting Grid with Shift and Flip Matrix

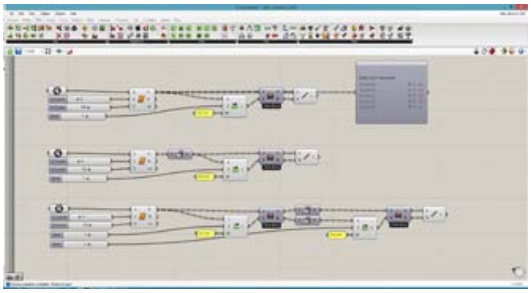

Image 5: Connecting Grid with Shift and Flip Matrix © http://atlv.org/education/grasshopper/

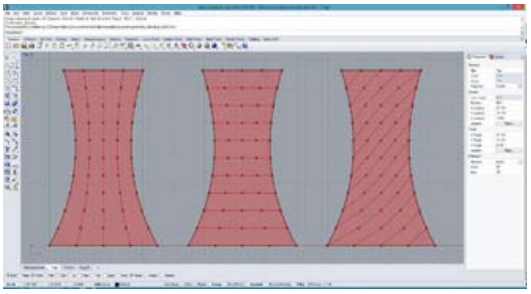

Image 6: Connecting Grid with Shift and Flip Matrix © http://atlv.org/education/grasshopper/

- Connecting Grid with Relative Item

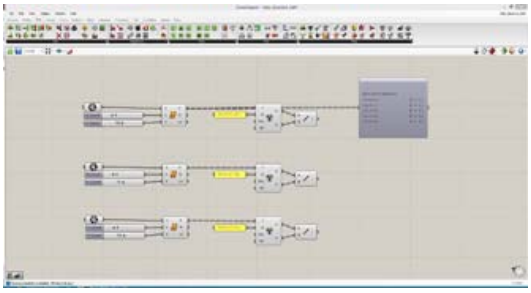

Image 7: Connecting Grid with Relative Item © http://atlv.org/education/grasshopper/

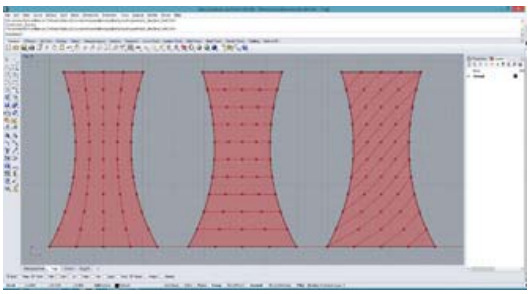

Image 8: Connecting Grid with Relative Item © http://atlv.org/education/grasshopper/

- Connecting Grid with Path Mapper and Split Tree

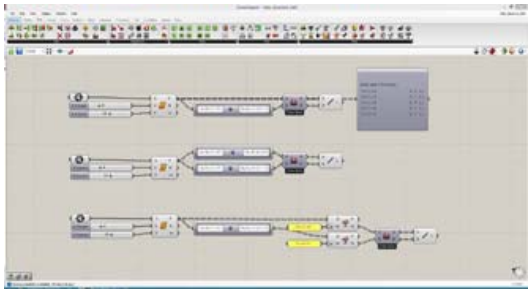

Image 9: Connecting Grid with Path Mapper and Split Tree © http://atlv.org/education/grasshopper/

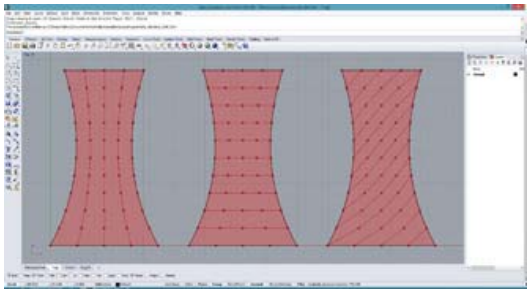

Image 10: Connecting Grid with Path Mapper and Split Tree © http://atlv.org/education/grasshopper/

- Connecting Grid with UV Range and Shift

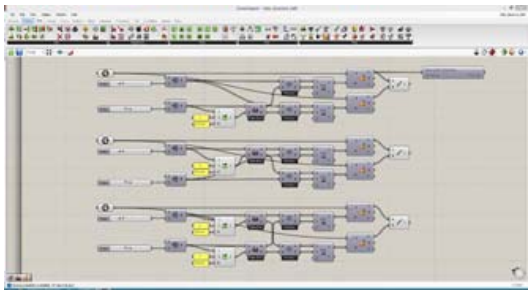

Image 11: Connecting Grid with UV Range and Shift © http://atlv.org/education/grasshopper/

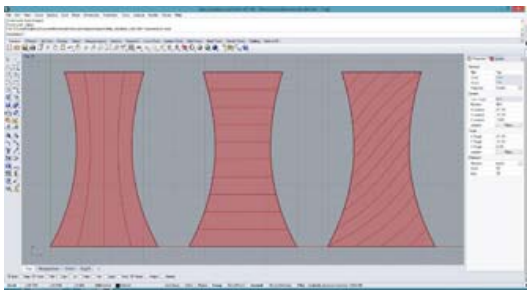

Image 12: Connecting Grid with UV Range and Shift © http://atlv.org/education/grasshopper/

- Connecting Closest Random Points with Find Similar Member

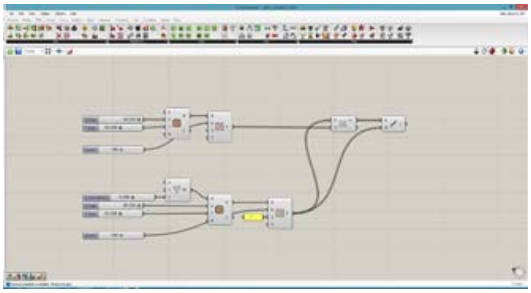

Image 13: Connecting Closest Random Points with Find Similar Members © http://atlv.org/education/grasshopper/

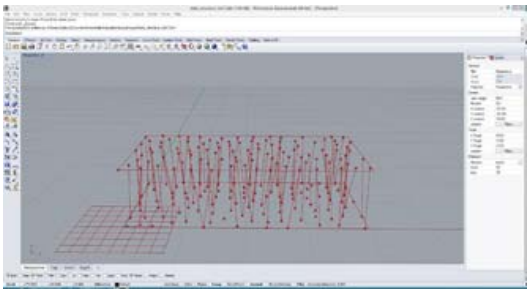

Image 14: Connecting Closest Random Points with Find Similar Members © http://atlv.org/education/grasshopper/

- Connecting Structure and Random Panels with Find Similar Member

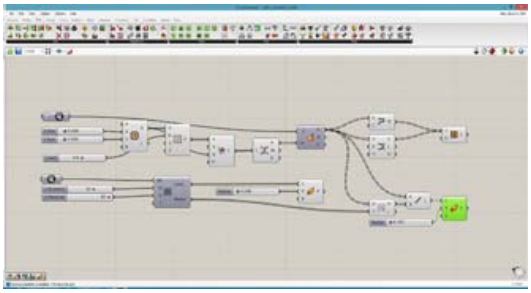

Image 15: Connecting Structure and Random Panels with Similar Members © http://atlv.org/education/grasshopper/

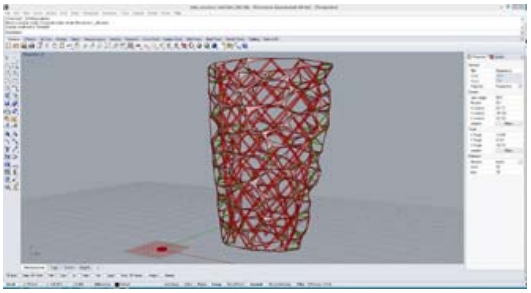

Image 16: Connecting Structure and Random Panels with Similar Members © http://atlv.org/education/grasshopper/

Weaverbird - Parametric Subdivision

The next series of scripts use another plugin called Weaverbird. As mentioned before 'Weaverbird' is available on Food 4 Rhino as well on other sites (http://development.food4rhino.com/project/weaverbird?ufh) or go to the developers homepage for more information. (http://www.giuliopiacentino.com/weaverbird/). There is also a good chapter about the plugin in the compulsory reading materials of this course see Arturo Tedeschi's 'Algorithmic Aided Design'. I am very certain that you will not understand what is going on in the following without reading the chapter in the book and hence only copy something you won't grasp.

- Quad Subdivision (Catmull-Clark Subdivision)

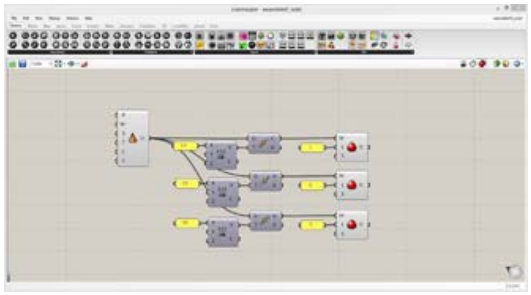

Image 1: Quad Subdivision (Catmull-Clark Subdivision) © http://atlv.org/education/grasshopper/

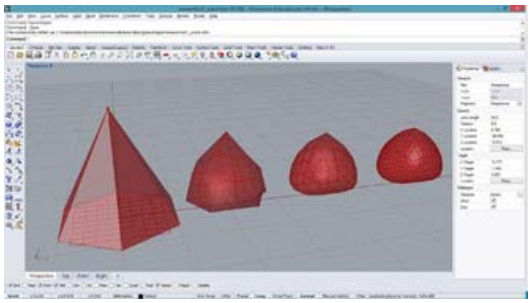

Image 2: Quad Subdivision (Catmull-Clark Subdivision) © http://atlv.org/education/grasshopper/

- Triangular Subdivision (Loop Subdivision)

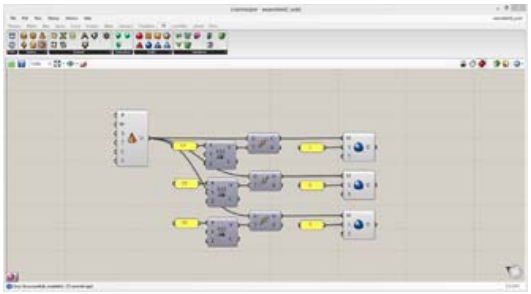

Image 3: Triangular Subdivision (Loop Subdivision) © http://atlv.org/education/grasshopper/

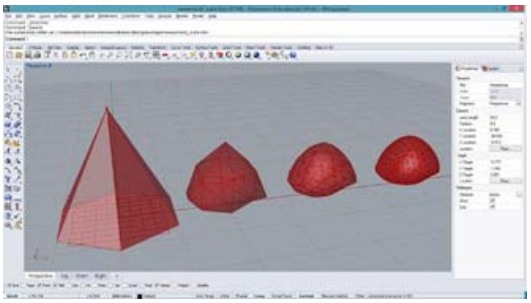

Image 4: Triangular Subdivision (Loop Subdivision) © http://atlv.org/education/grasshopper/

- Construct Mesh Out Of Lines

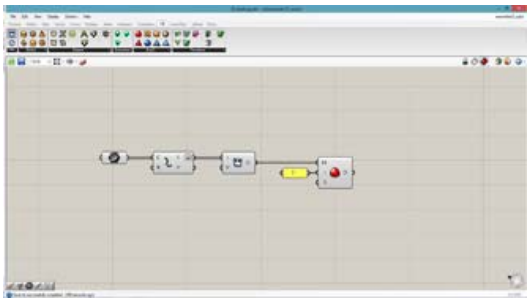

Image 5: Construction Mesh out of Lines © http://atlv.org/education/grasshopper/

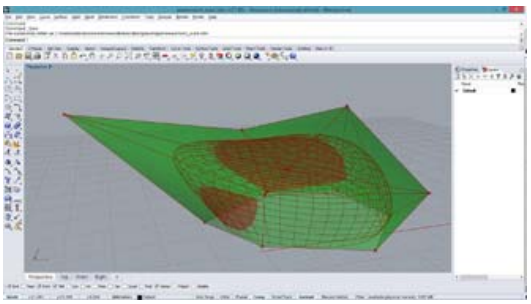

Image 6: Construction Mesh out of Lines © http://atlv.org/education/grasshopper/

- Beveling Mesh

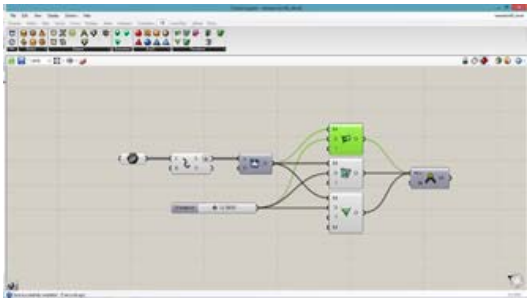

Image 7: Beveling Mesh © http://atlv.org/education/grasshopper/

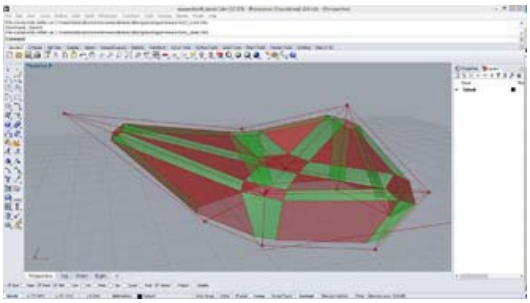

Image 7: Beveling Mesh © http://atlv.org/education/grasshopper/

- Framing Mesh

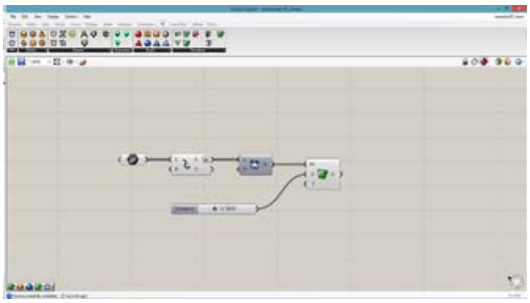

Image 8: Framing Mesh © http://atlv.org/education/grasshopper/

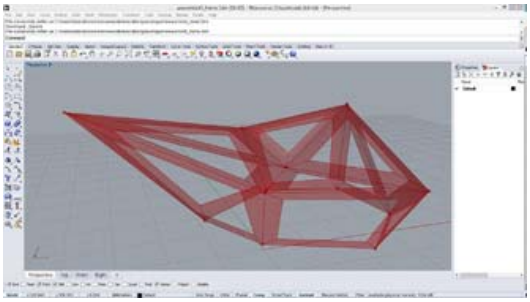

Image 8: Framing Mesh © http://atlv.org/education/grasshopper/

- Thickening Mesh

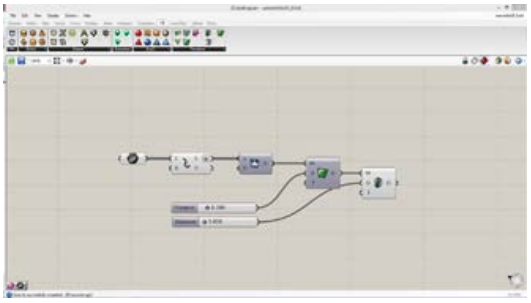

Image 9: Thickening Mesh © http://atlv.org/education/grasshopper/

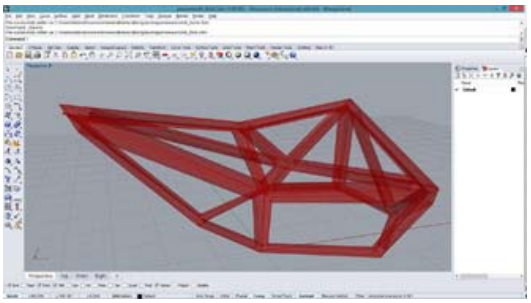

Image 10: Thickening Mesh © http://atlv.org/education/grasshopper/

- SubD Frame (Quad Subdivision)

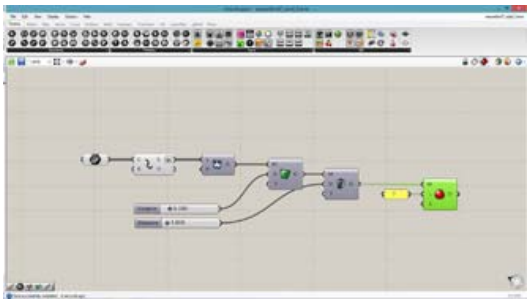

Image 11: SubD Frame (Quad Subdivision) © http://atlv.org/education/grasshopper/

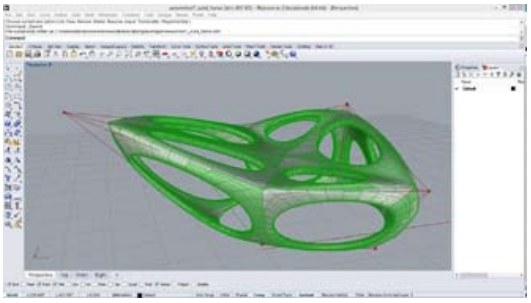

Image 12: SubD Frame (Quad Subdivision) © http://atlv.org/education/grasshopper/

- SubD Frame (Triangular Subdivision)

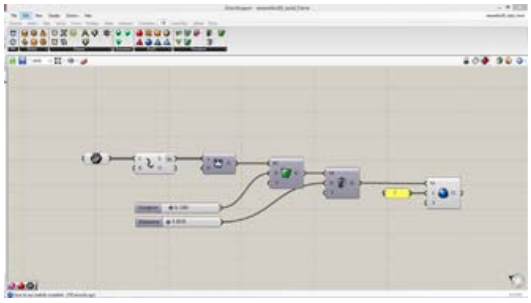

Image 13: SubD Frame (Triangular Subdivision) © http://atlv.org/education/grasshopper/

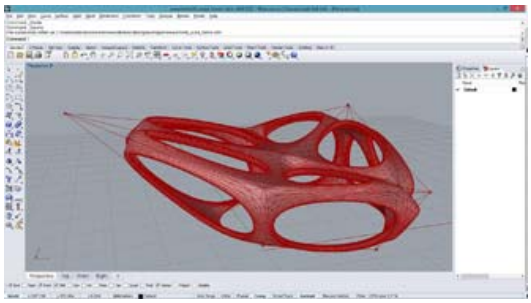

Image 14: SubD Frame (Triangular Subdivision) © http://atlv.org/education/grasshopper/

- Face Stellation

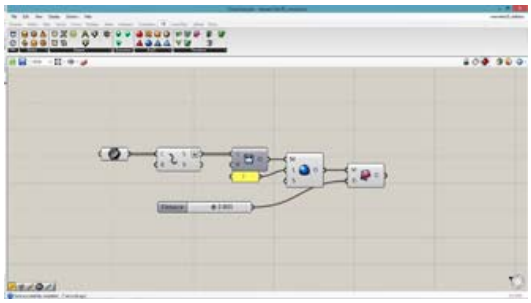

Image 15: Face Stellation © http://atlv.org/education/grasshopper/

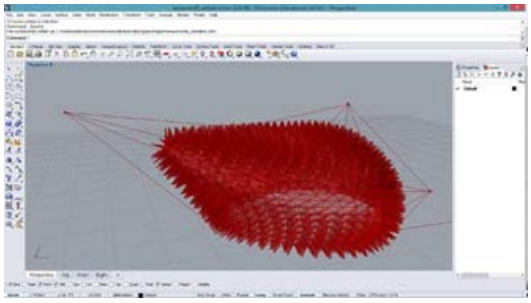

Image 16: Face Stellation © http://atlv.org/education/grasshopper/

- Face Stellation with Wave Attractors

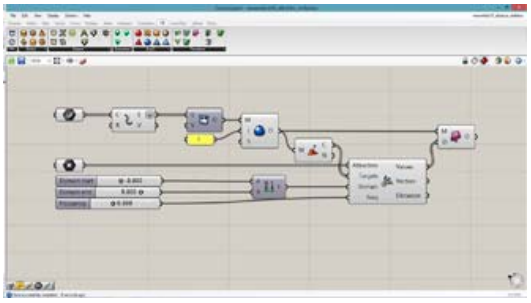

Image 17: Face Stellation with Wave Attractors © http://atlv.org/education/grasshopper/

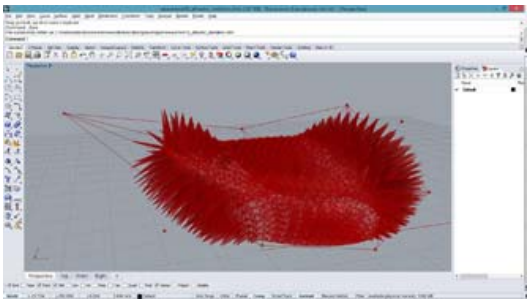

Image 17: Face Stellation with Wave Attractors © http://atlv.org/education/grasshopper/

- Mesh Offset with Wave Attractors

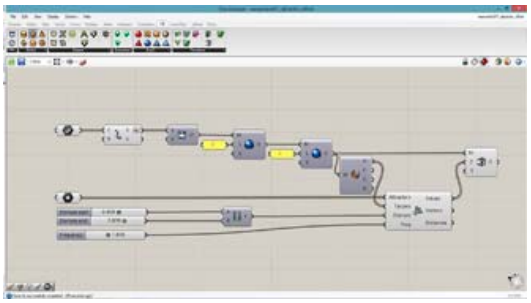

Image 18: Mesh Offset with Wave Attractors © http://atlv.org/education/grasshopper/

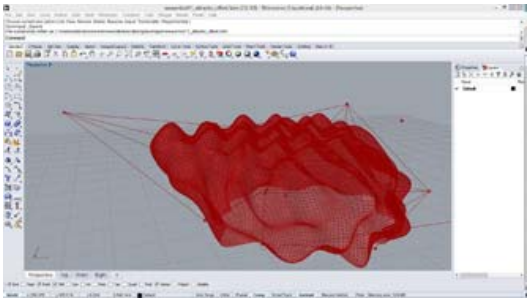

Image 19: Mesh Offset with Wave Attractors © http://atlv.org/education/grasshopper/

Kangaroo – Physics Simulation

The next plugin for Grasshopper introduced in this course is 'Kangaroo'. Kangaroo is a physics simulation engines hence it mimics physical forces such as gravity, tension, wind, or pressure. As the plugins prior Kangaroo can be found at:

(http://www.food4rhino.com/project/kangaroo?ufh)

- Simple Gravity

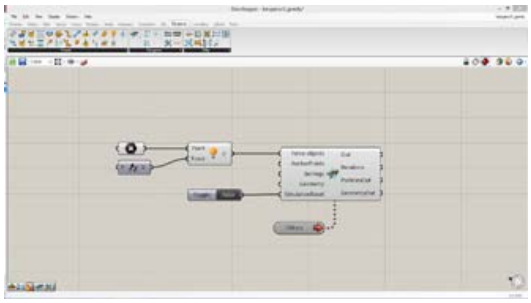

Image 1: Simple Gravity © http://atlv.org/education/grasshopper/

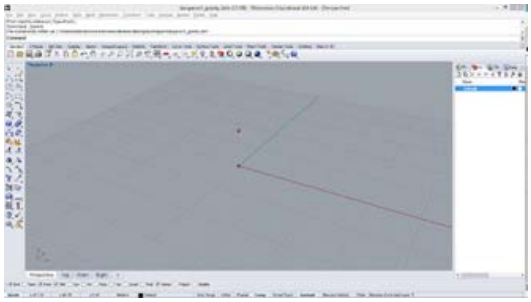

Image 2: Simple Gravity © http://atlv.org/education/grasshopper/

- Catenary Line

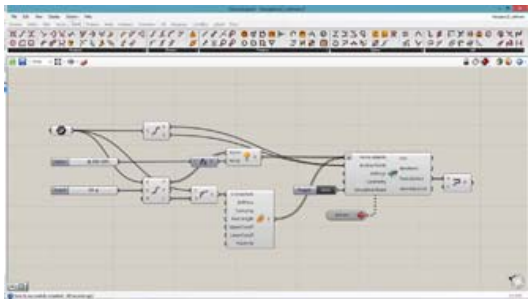

Image 3: Catenary Line © http://atlv.org/education/grasshopper/

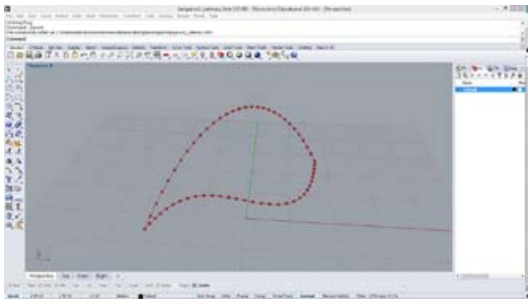

Image 3: Catenary Line © http://atlv.org/education/grasshopper/

- Mesh Catenary

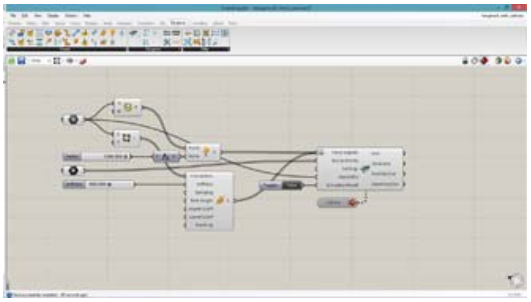

Image 4: Catenary Mesh © http://atlv.org/education/grasshopper/

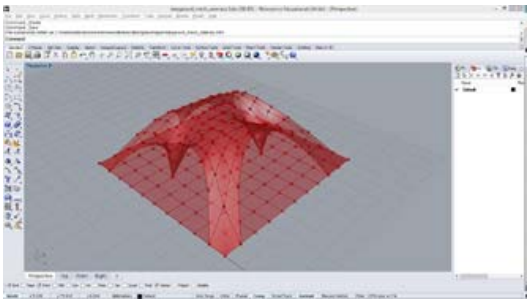

Image 5: Catenary Mesh © http://atlv.org/education/grasshopper/

- Mesh Catenary 2

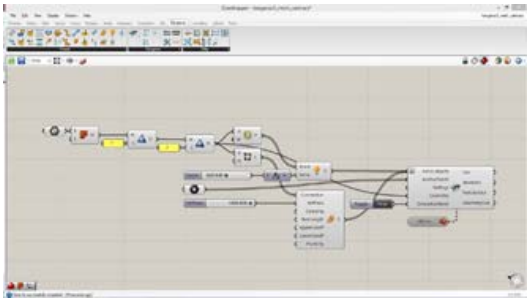

Image 6: Catenary Mesh 2 © http://atlv.org/education/grasshopper/

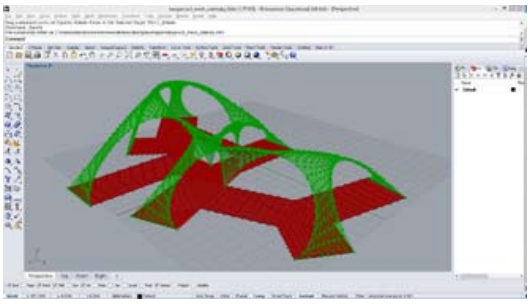

Image 7: Catenary Mesh 2 © http://atlv.org/education/grasshopper/

- Voronoi Catenary

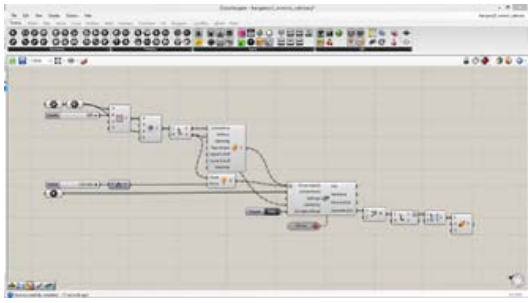

Image 8: Voronoi Catenary © http://atlv.org/education/grasshopper/

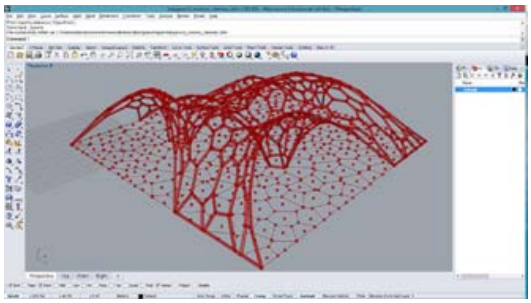

Image 8: Voronoi Catenary © http://atlv.org/education/grasshopper/

- Mesh Relaxation with Tension

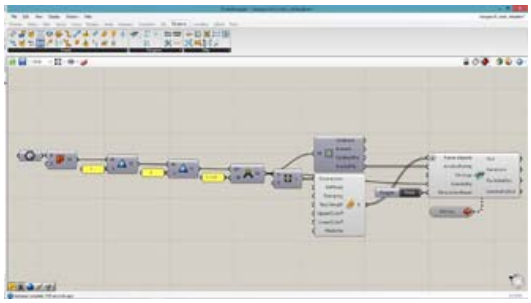

Image 9: Mesh Relaxation with Tension © http://atlv.org/education/grasshopper/

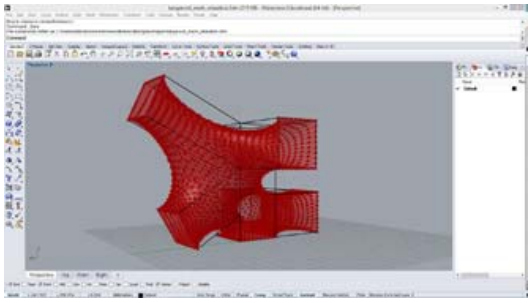

Image 10: Mesh Relaxation with Tension © http://atlv.org/education/grasshopper/

- Mesh Relaxation with Tension 2

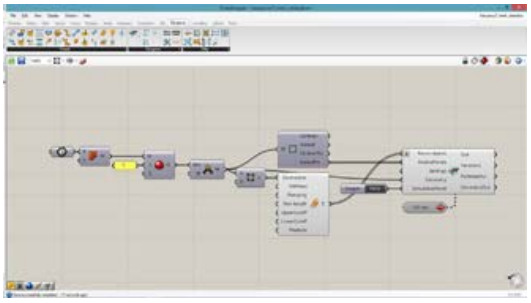

Image 11: Mesh Relaxation with Tension 2 © http://atlv.org/education/grasshopper/

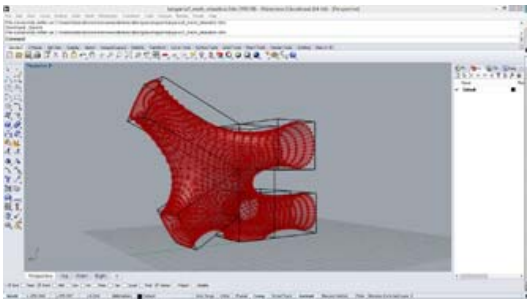

Image 12:: Mesh Relaxation with Tension 2 © http://atlv.org/education/grasshopper/

- Mesh Inflation with Pressure

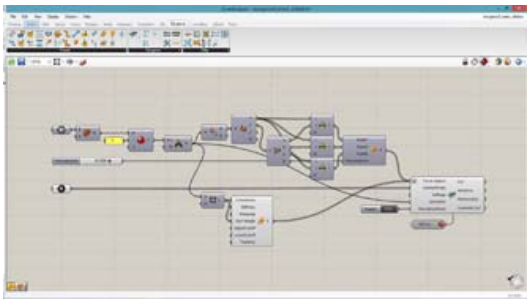

Image 13: Mesh Inflation with Pressure © http://atlv.org/education/grasshopper/

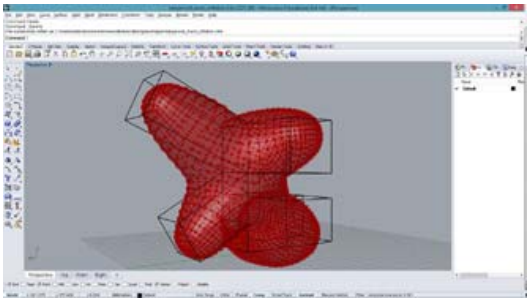

Image 14: Mesh Inflation with Pressure © http://atlv.org/education/grasshopper/

- Mesh Membrane with Tension, Gravity and Wind

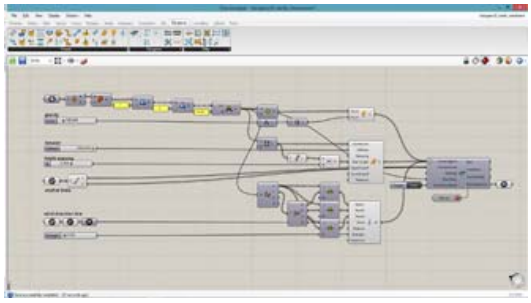

Image 15: Mesh Membrane with Tension, Gravity and Wind © http://atlv.org/education/grasshopper/

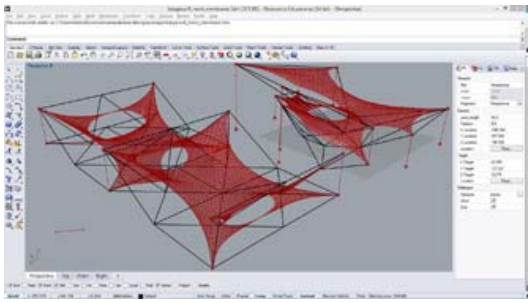

Image 16: Mesh Membrane with Tension, Gravity and Wind © http://atlv.org/education/grasshopper/

Flat Panelization

The following scripts built upon the ones above but do not introduce a new plugin. The scripts are aimed to help the design of a façade where a large surface needs to be divided into smaller elements (i.e. glass panels). Hence the scripts below enable the scripts above in regards to built-ability.

- Flat Quad Panelization

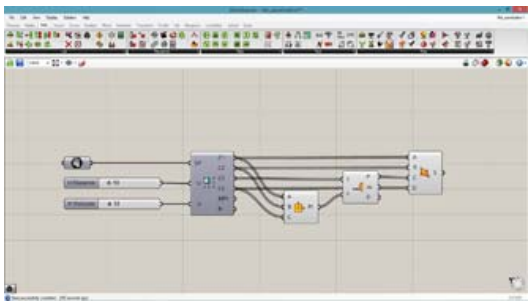

Image 1: Flat Quad Panelization © http://atlv.org/education/grasshopper/

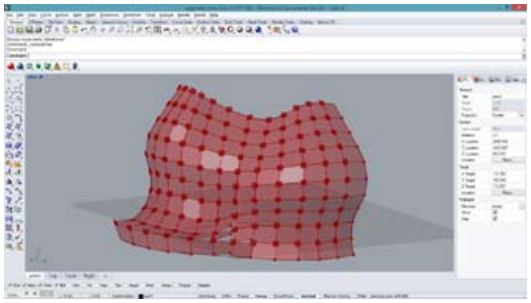

Image 2: Flat Quad Panelization © http://atlv.org/education/grasshopper/

- Flat Quad Panelization, Front Panel Selection

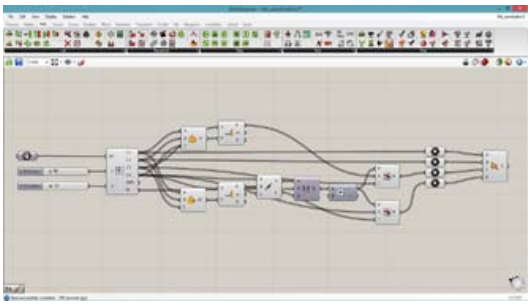

Image 3: Flat Quad Panelization, Front Panel Selection © http://atlv.org/education/grasshopper/

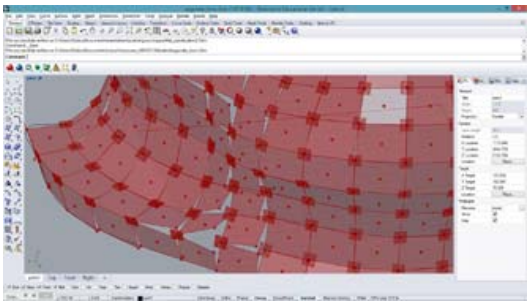

Image 4: Flat Quad Panelization, Front Panel Selection © http://atlv.org/education/grasshopper/

- Flat Quad Panelization 2

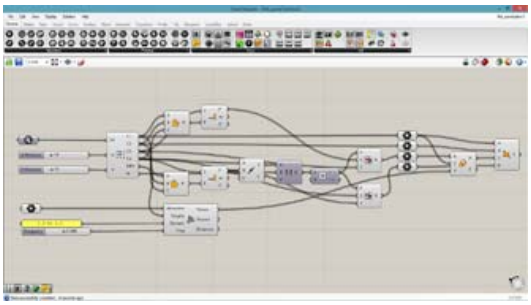

Image 5: Flat Quad Panelization 2 © http://atlv.org/education/grasshopper/

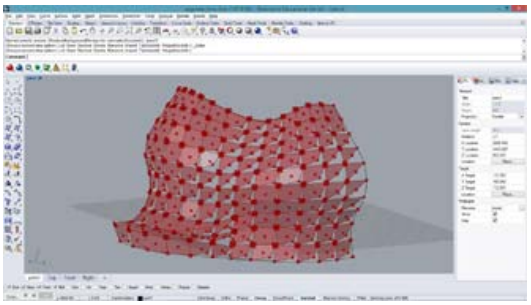

Image 6: Flat Quad Panelization © http://atlv.org/education/grasshopper/

- Flat Panelization 1

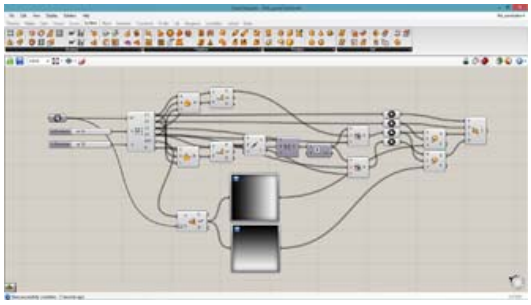

Image 7: Flat Panelization 1 © http://atlv.org/education/grasshopper/

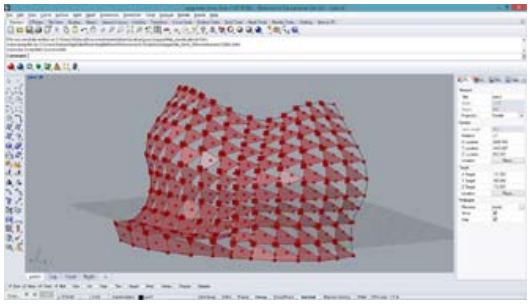

Image 8: Flat Panelization 1 © http://atlv.org/education/grasshopper/

- Flat Panelization 2

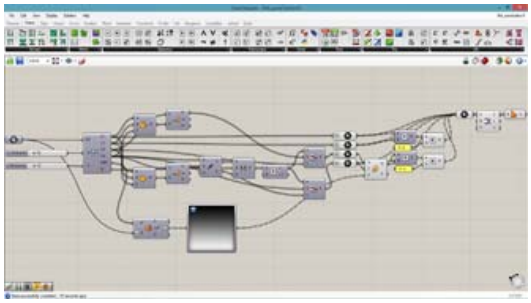

Image 9: Flat Panelization 2 © http://atlv.org/education/grasshopper/

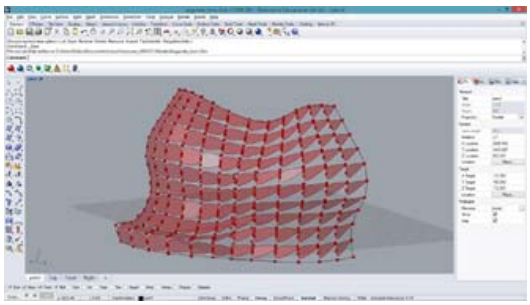

Image 10: Flat Panelization 2 © http://atlv.org/education/grasshopper/

- Flat Panelization with Holes 1

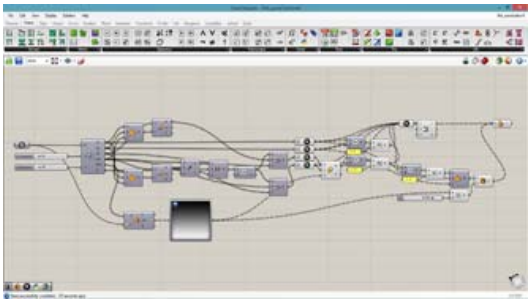

Image 11: Flat Panelization with Holes 1 © http://atlv.org/education/grasshopper/

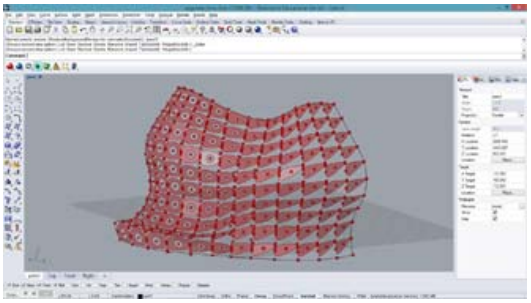

Image 12: Flat Panelization with Holes 1 © http://atlv.org/education/grasshopper/

- Flat Panelization with Holes 2

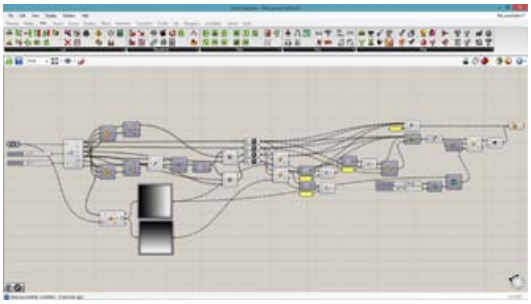

Image 13: Flat Panelization with Holes 2 © http://atlv.org/education/grasshopper/

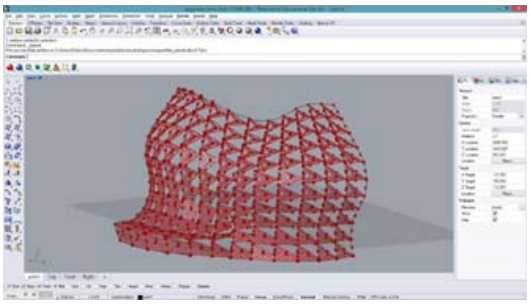

Image 14: Flat Panelization with Holes 2 © http://atlv.org/education/grasshopper/

- Unfolding Flat Panels

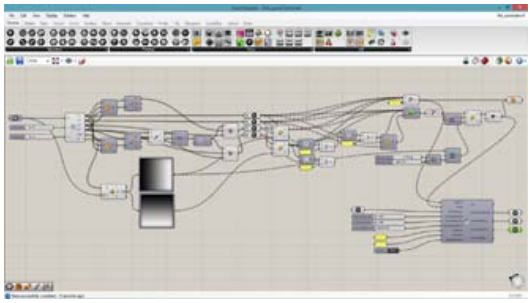

Image 15: Unfolding Flat Panels © http://atlv.org/education/grasshopper/

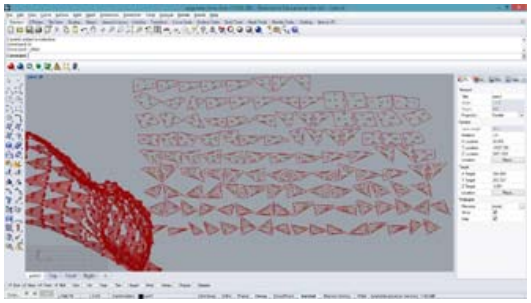

Image 15: Unfolding Flat Panels © http://atlv.org/education/grasshopper/

Egg Crate Frames and Unfolding

The last two series of scripts are mainly looking into unfolding surfaces and forms in order to produce them either via laser cutting or CNC milling. The first here calles 'Egg crate frames' refers to a method of building 3D objects out of 2D panels what we call in CoDe waffling structures.

- Egg Crate by Guide Curve

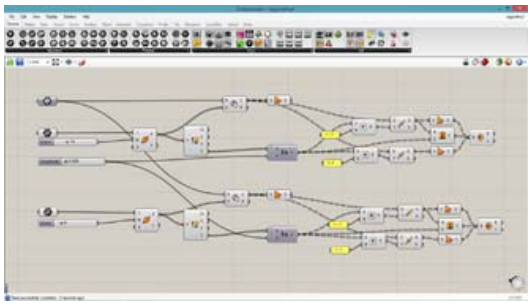

Image 1: Egg crate by Guide Curve © http://atlv.org/education/grasshopper/

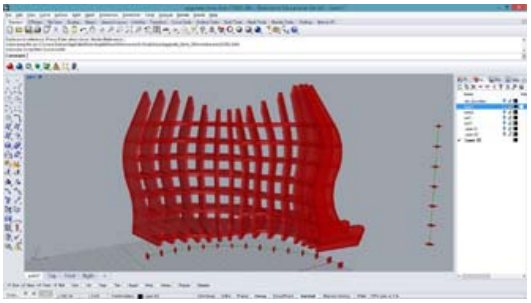

Image 2: Egg crate by Guide Curve © http://atlv.org/education/grasshopper/

- Egg Crate by Guide Curve and Points

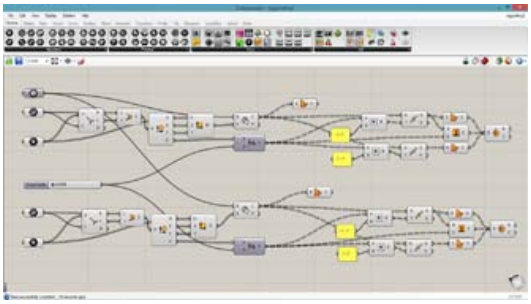

Image 3: Egg crate by Guide Curve and Points © http://atlv.org/education/grasshopper/

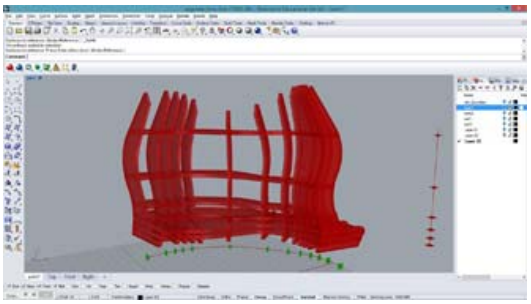

Image 4: Egg crate by Guide Curve and Points © http://atlv.org/education/grasshopper/

- Egg Crate by Planes

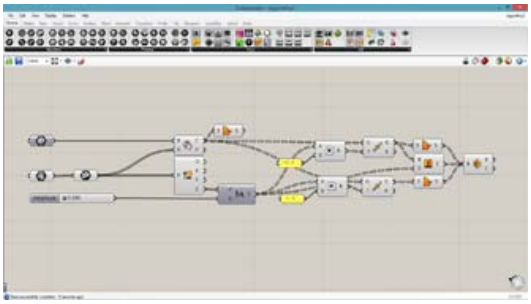

Image 5: Egg crate by Planes © http://atlv.org/education/grasshopper/

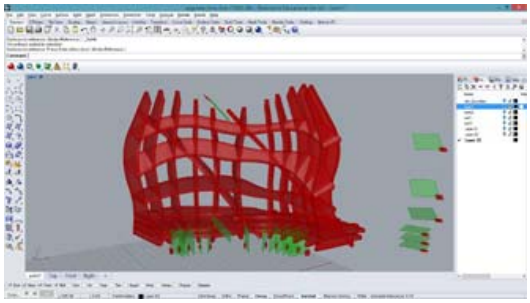

Image 6: Egg crate by Planes © http://atlv.org/education/grasshopper/

- Radial Egg Crate by Guide Curve

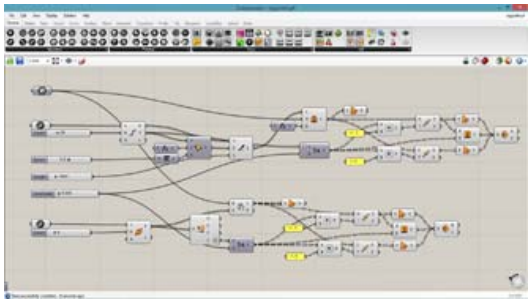

Image 7: Radial Egg crate by Guide Curve © http://atlv.org/education/grasshopper/

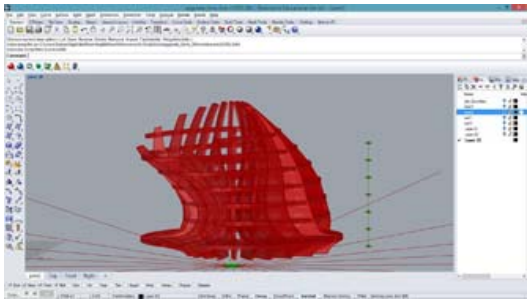

Image 8: Radial Egg crate by Guide Curve © http://atlv.org/education/grasshopper/

- Radial Egg Crate by Guide Curve and Points

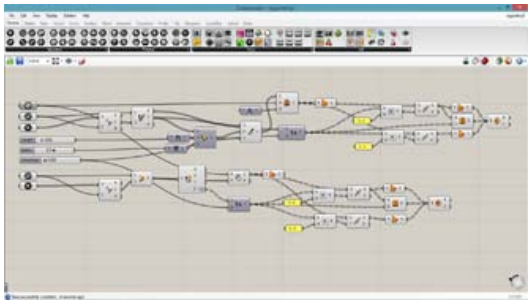

Image 9: Radial Egg crate by Guide Curve and Points © http://atlv.org/education/grasshopper/

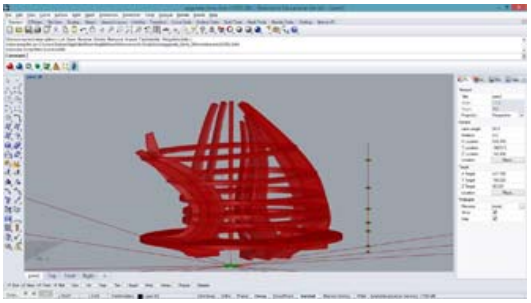

Image 9: Radial Egg crate by Guide Curve and Points © http://atlv.org/education/grasshopper/

- Radial Egg crate by Planes

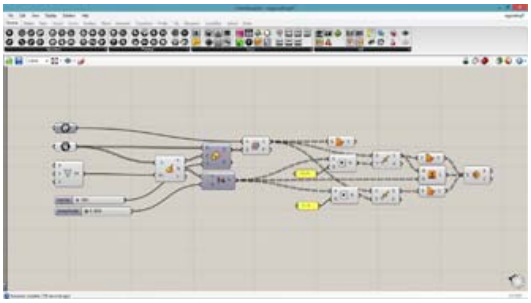

Image 10: Radial Egg crate by Planes © http://atlv.org/education/grasshopper/

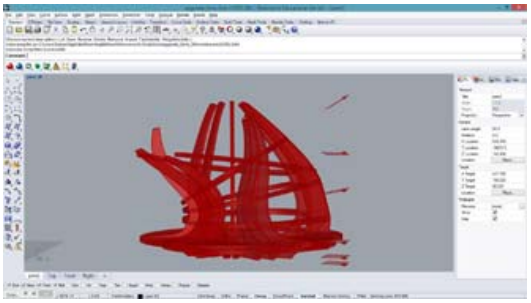

Image 11: Radial Egg crate by Planes © http://atlv.org/education/grasshopper/

- Making Notches of Egg Crate

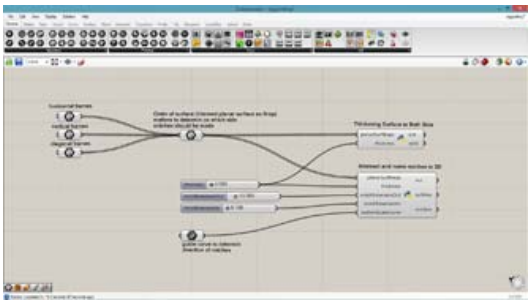

Image 12: Making Notches of Egg Crate © http://atlv.org/education/grasshopper/

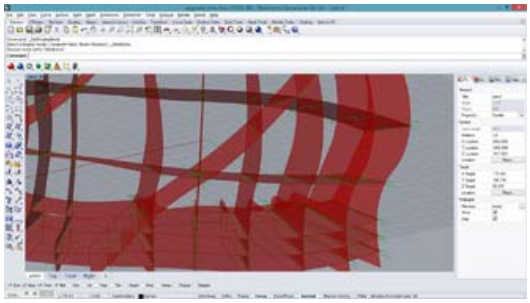

Image 13: Making Notches of Egg Crate © http://atlv.org/education/grasshopper/

- Unfolding Egg Crate Frames

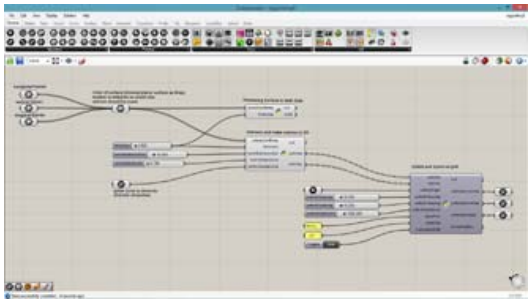

Image 14: Unfolding Egg Crate Frames © http://atlv.org/education/grasshopper/

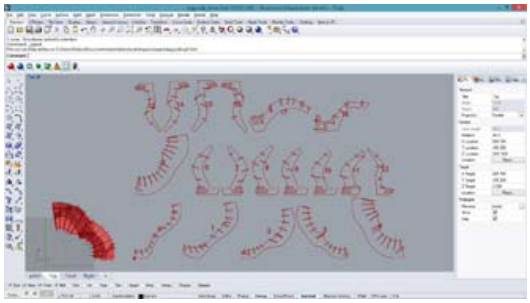

Image 15: Unfolding Egg Crate Frames © http://atlv.org/education/grasshopper/

Folded Panel and Unfolding

As with the Egg Crate (Waffling structure) the following series of script investigates how to unfold panels in order to produce them later using one of the machines available to students.

- Folded Panel

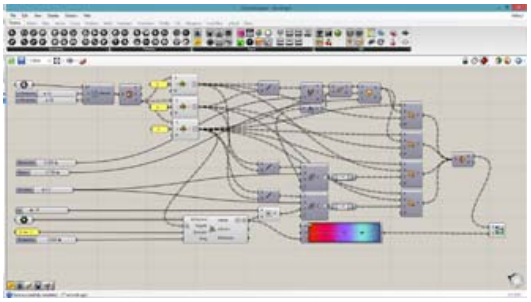

Image 1: Folded Panel © http://atlv.org/education/grasshopper/

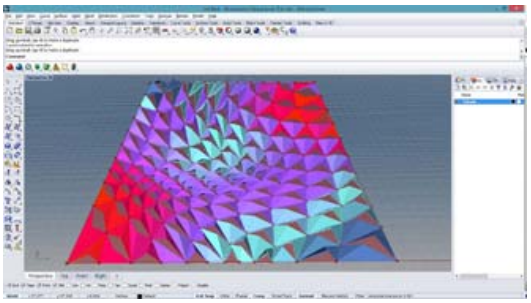

Image 2: Folded Panel © http://atlv.org/education/grasshopper/

- Unfolding and Labeling

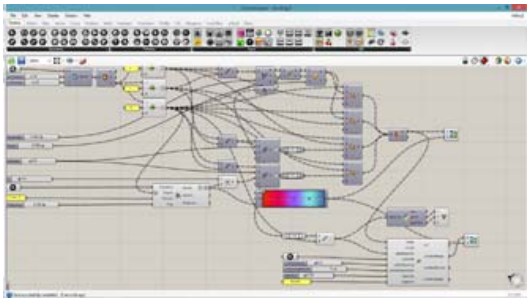

Image 3: Folding and Labeling © http://atlv.org/education/grasshopper/

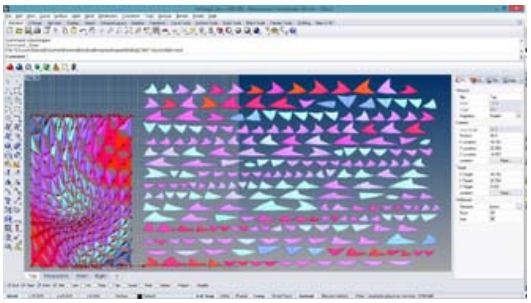

Image 4: Folding and Labeling © http://atlv.org/education/grasshopper/

- Baking with Colours

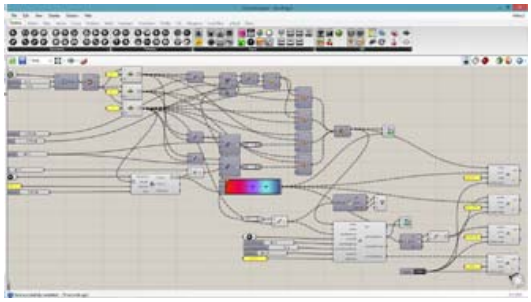

Image 5: Baking with Colours © http://atlv.org/education/grasshopper/

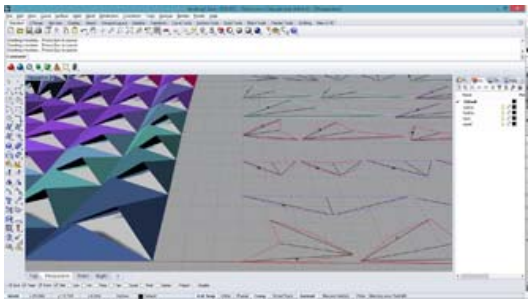

Image 6: Baking with Colours © http://atlv.org/education/grasshopper/

- Folded Panel with Delaunay

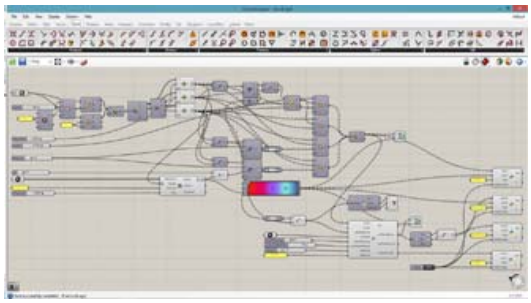

Image 7: Folded Panel with Delaunay © http://atlv.org/education/grasshopper/

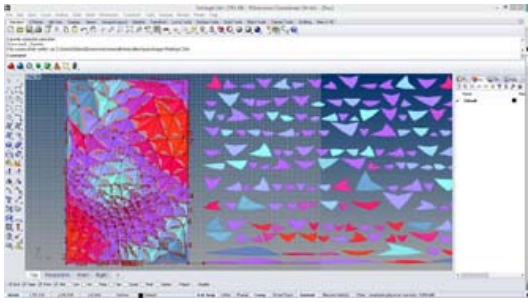

Image 8: Folded Panel with Delaunay © http://atlv.org/education/grasshopper/

- Folded Panel with Voronoi

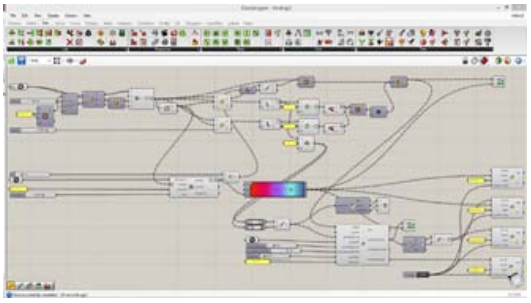

Image 9: Folded Panel with Voronoi © http://atlv.org/education/grasshopper/

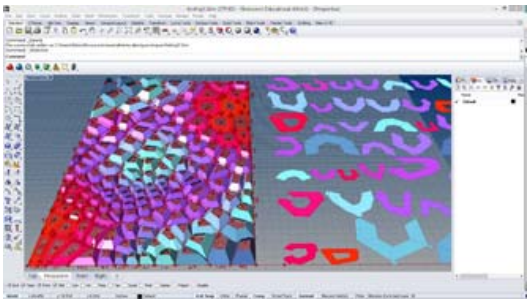

Image 10: Folded Panel with Voronoi © http://atlv.org/education/grasshopper/

- Folded Panel with Hexagon Grid

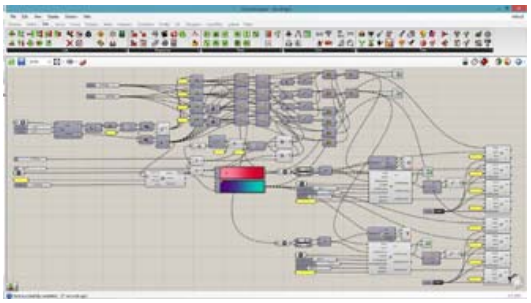

Image 11: Folded Panel with Hexagon Grid © http://atlv.org/education/grasshopper/

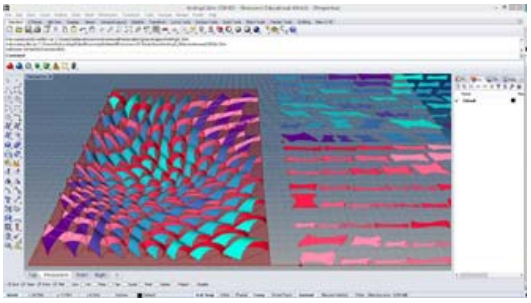

Image 12: Folded Panel with Hexagon Grid © http://atlv.org/education/grasshopper/

- Folded Panel with Quad Grid

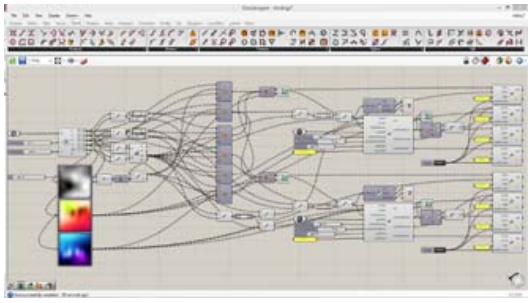

Image 13: Folded Panel with Quad Grid © http://atlv.org/education/grasshopper/

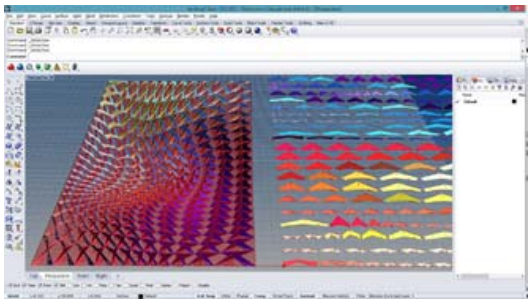

Image 14: Folded Panel with Quad Grid © http://atlv.org/education/grasshopper/

- Folded Panel and Projected Lines

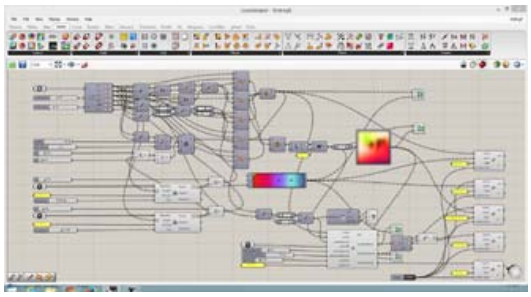

Image 15: Folded Panel with Projected Lines© http://atlv.org/education/grasshopper/

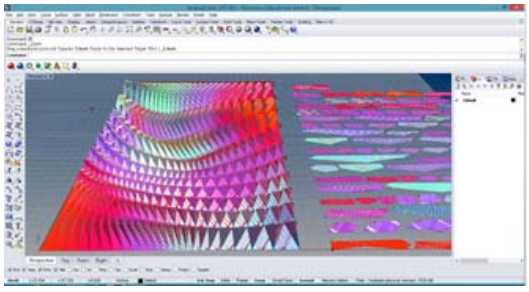

Image 16: Folded Panel with Projected Lines© http://atlv.org/education/grasshopper/

12. Expectations

Students are expected to attend all lectures and tutorials. To pass the course

students are required to hand in all three phases of the project.

If you experience and difficulties please refer to Special Consideration, Late Work and other policies in the BE Policy Outline at:

http://www.be.unsw.edu.au/student-intranet/academic-policies

13. Learning experience and teaching strategies

This course introduces students to contemporary computer gaming software in combination with parametric modelling software to facilitate the design of a small scaled hybrid public/private space.

Much of the technical instruction will occur through a curated set on online resources.

The design studio will host the tutorial sessions where students will respond to a design brief.

In addition to technical skill acquisition of the studio students will be introduced, via the lecture series, to a range of theoretical positions that broaden and contextualise the opportunities afforded by the technology.

14. Course aims

Course Aim 1: The course will develop skill in using contemporary computer gaming software to facilitate the design and evaluation of a small scaled public building.

Course Aim 2: to comprehend and construct a site and design a response to a brief within strictly prescribed limits.

Course Aim 3: to develop computationally driven design strategies.

15. Learning outcomes

At the successful conclusion of this course the student will be able to:

1: Build environments and architecture within a contemporary computer gaming environment.

2: Evaluate their designs using predefined parameters.

3: Develop parametric scripts that clearly express design intent.

4. Model and texture architectural models in 3dsmax.

5: Comprehend and apply theoretical positions that relate computation and architectural design.

16. Built Environment and UNSW Academic Policies

The **Built Environment Protocols and UNSW Policies & Procedures** document supplements this course outline providing detail on academic policies and other administrative matters. It is your duty as a student to familiarise yourself with the expectations as not adhering to them will be considered as academic misconduct. Ignorance of the rules is not an acceptable defence.

The document can be found in your Moodle course as well as: http://www.be.unsw.edu.au/student-intranet/academic-policies

It covers:

- Built Environment Student Attendance Requirements
- Units of Credit (UOC) and Student Workload
- Course and Teaching Evaluation and Improvement (CATEI)
- Academic Honesty and Plagiarism
- Late Submissions Penalties
- Special Consideration - Illness & Misadventure
- Extension of Deadlines
- Learning Support Services
- Occupational Health & Safety