

UDIKSHA NAGARAJ KAPINI
Design Portfolio
Architectural Technologies

U D I K S H A N A G A R A J

K A P I N I

BIM Technologist

PROFILE

✉ udiksha.nk@gmail.com

☎ +1 404 539 8684

🌐 udiksho.net

EDUCATION

Master of Science in Architecture
(Building Information Systems)
2019-2021
Georgia Institute of Technology,
School of Architecture,
Atlanta, GA USA

Bachelor of Architecture
2014-2019
RV College of Architecture,
Bangalore, INDIA

SKILLS

BIM :
• Revit
• BIM 360
• Archicad
• Vectorworks
• AutoCAD

3D Modeling:
• SkechUp
• Rhinoceros

Scripting/Coding:
• Grasshopper 3D
• DynamoBIM
• JavaScript
• Three.js
• p5.js

Adobe Creative Suite:
• Photoshop
• Illustrator
• InDesign

Performance:
• Ladybug
• covetool
• Climate Studio
• OpenStudio
• Honeybee
• Navisworks

Rendering:
• Lumion
• Enscape
• V-Ray for SketchUp

AR for Rhinoceros :
Fologram

Microsoft Office Suite

EXPERIENCE

BIM Specialist II | Cove Tool, Inc | Atlanta | June 2021 - November 2023

- Directed the development of 10+ geometry plugins/tools and BIM standardization workflows, enhancing user adoption, and software functionality.
- Led a global team of 5 BIM coordinators and modelers, focused on strategic objective, and performance optimization.
- Managed several inter-departmental meetings with software engineers and consultants for strategic prioritization, driving efficient project management.
- Collaborated cross-functionally with sales, customer success, and marketing to ensure a seamless technical client experience. Produced 100+ types of educational content on green building practices and various learning resources to improve customer support and engagement in sustainability.
- Advanced cloud-based 3D modeling applications with a focus on sustainable design metrics by optimizing UI/UX and core functionalities, defined technical user stories and comprehensive documentation, ensuring user-centric software development.
- Supervised vital software features for sustainable architecture goals, formulating technical product roadmaps, MVP benchmarks, & documentation.
- Managed resource allocation and project timelines, prioritizing tasks for strategic importance to drive efficient, impactful software development.
- Handled major BIM & LEED projects, improving model uploads. Established energy modeling-focused BIM standards for enhanced industry efficiency.
- Articulated product direction at national conferences and forums, enhancing academic and industry engagement

Graduate Assistant | Georgia Tech - Capital Planning and Space Management | September 2019 - May 2021

- Created 3D visualization for architectural & planning projects including the Georgia Tech Student Center, Reck Garage and Campanile Plaza.
- Conceptualized University interior floor plans & renders for space optimization studies and data analytics.
- Updated and recorded detailed architectural changes to campus 3D models & plans, adapting to the evolving requirements of several departments.
- Developed wayfinding processes in campus spaces for pedestrians and E-bikes.

Architectural Intern | Creative Choice Group | West Palm Beach | August 2020 - November 2020

- Developed design visualizations, 3D coordination, and as built documentation for a high-rise building using BIM workflows.
- Synchronized advanced 3D modeling outputs with construction project timelines, optimizing workflow efficiency
- Facilitated on-site integration of as-built conditions with corresponding drawings and visualizations tools.

ACHIEVEMENTS

2023 • Honorable Mention for Project STASIO Annual Competition 2023 by the International Building Performance Simulation Association (IBPSA USA).

2022 • Published Paper titled "Impact assessment of Energy Conservation Measures on Building Energy Consumption, Carbon Emissions, and Adaptation Cost using Future Weather Data" 2022 Annual Modeling and Simulation Conference 2022 (ANNSIM), San Diego doi: 10.2391. In collaboration with Z.Zolfaghari, T.Raja, D.Salinas, P.Kusumadja and P.Pease

2014-2019 • Rank 3 in CET NATA Karnataka State, INDIA (Undergraduate B.Arch) : Awarded full Tuition waiver.
2018 • WADE Student Project Award by WADE ASIA India, Federation of Woman Architects, Designers, India.
2017 • Silver Medal, NATIONAL DESIGN AWARD BY NDRF, INDIA (National Design and Research Forum)
• A3F Passion Perfect Student Award by A3F Foundation (Ar. SD Sharma) Chandigarh.

VOLUNTEER EXPERIENCE

2018 • Numismatic Exhibition Coordinator prepared collection display from 45 countries.
2017 • Campus Design Head - RV College of Architecture annual exhibition ZEITGEIST
2008 • Ethos Art Gallery - Assistant, coordinated with various artist for displays, consolidated price list, spreadsheets, data base of artists and maintenance.

Summary

BIM (Building Information Modeling) Technologist leading product initiative and innovative applications for diverse geometry and BEM (Building Energy Modeling) in the AEC (Architecture, Engineering, and Construction) industry for over 25,000 global users. Led company strategy for BIM implementation, data-driven design optimization and Building Technology Product Research for sustainable solutions. Executed 600+ in-depth-technical product demonstrations enhancing customer integration and sales efforts.

Contents

1. BIM-DESIGN TECHNOLOGY

|Cove Tool, Inc
|Creative Choice Group

2. RESEARCH PROJECTS

| BIM/IoT spatial data Integration
| Spatiotemporal Modeling COVID-19

3. WORK

Fall 2020 Internship
Georgia Tech : CPSM Projects

| Architectural Intern: Creative Choice Group
| O'Keefe Volleyball Gymnasium
| Ramblin' Wreck Garage

4.ACADEMIC: MS ARCH

Automation of Pre-fabricated steel procurement
Performance Optimization, Drew Charter School
Reverse Isovist
ERP Building, BIM as-built Modeling
Building Performance Simulation
Web Graphics for Building Applications
The Triangular Dynamism :
AR Digital-Physical construct Fologram

| Building Systems & Data
| Building Simulation in Design
| Inquiries in Design Computation
| **Building Information Modeling**
| Building Physics Modeling
| Design Programming
| Media and Modeling
| Advanced Production

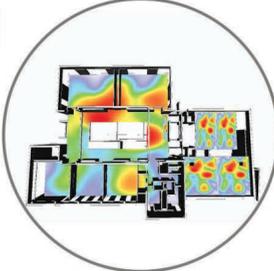
4. ACADEMIC: B.ARCH

Internships

|Education Design Architects
|CCBA Design pvt. ltd.
| Verve Group
|B.Arch Thesis

Symphony of Aural spaces

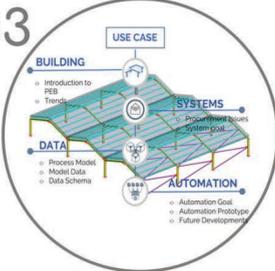
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02



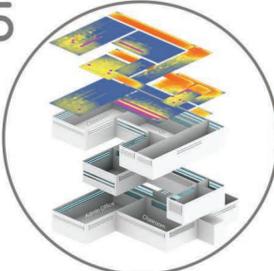
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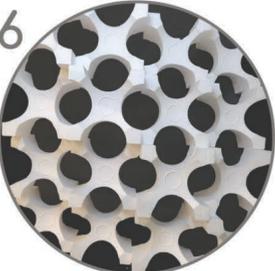
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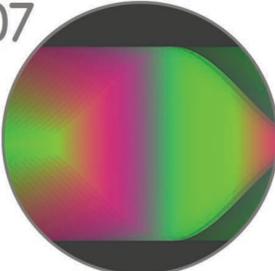
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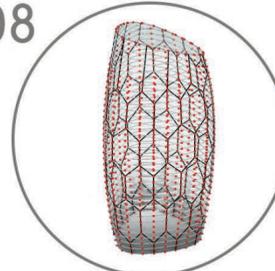
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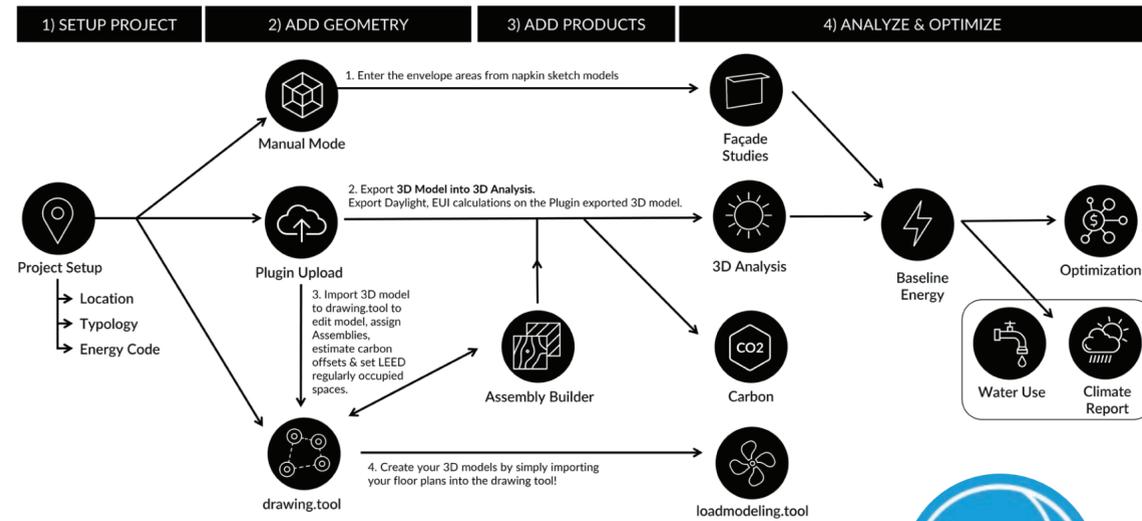


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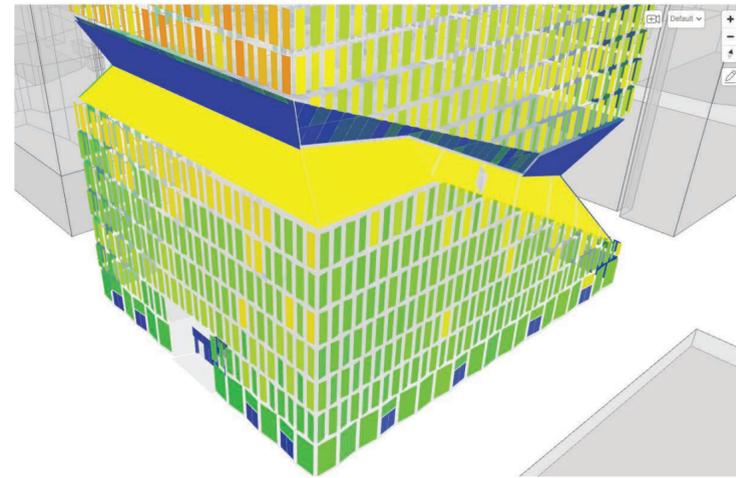
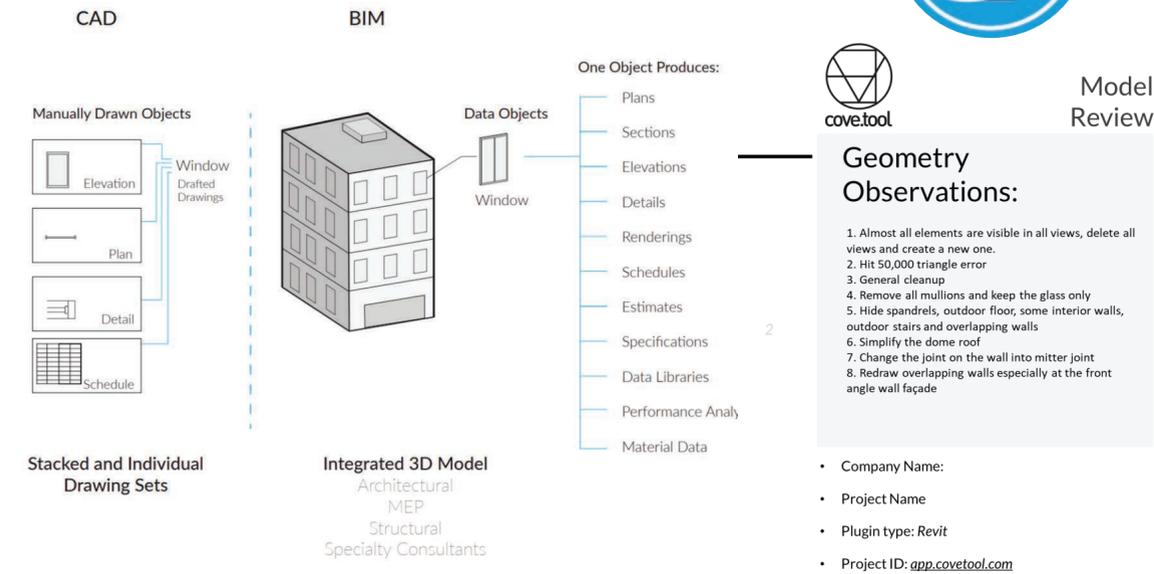


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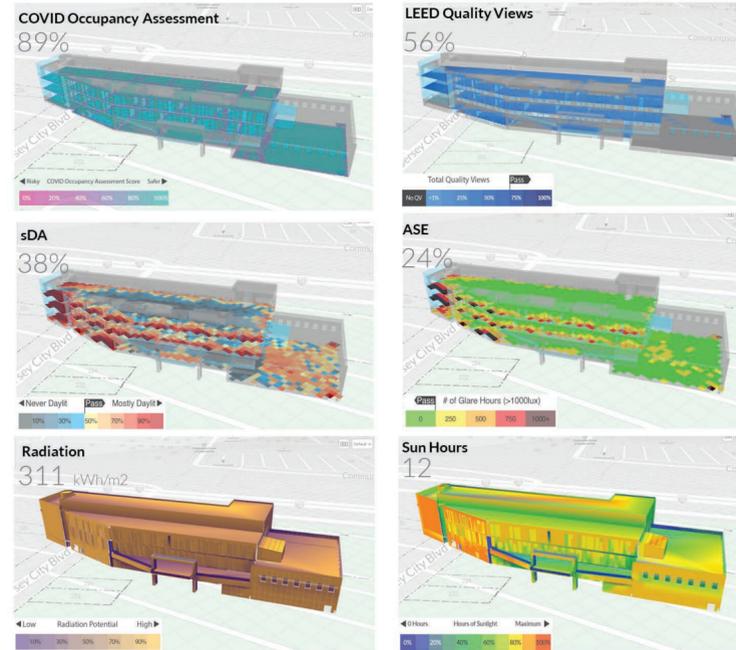




BIM-GEOMETRY WORKFLOW OPTIMIZATION



BUILDING INFORMATION MODEL > BUILDING ENERGY MODEL



Cove Tool, Inc
BIM Technology - Product Development

The drawing.tool is a web-based 3D modeling application that provides a user-friendly platform for AEC professionals to draw their early-stage models built from the ground up to connect all features seamlessly across the product portfolio.



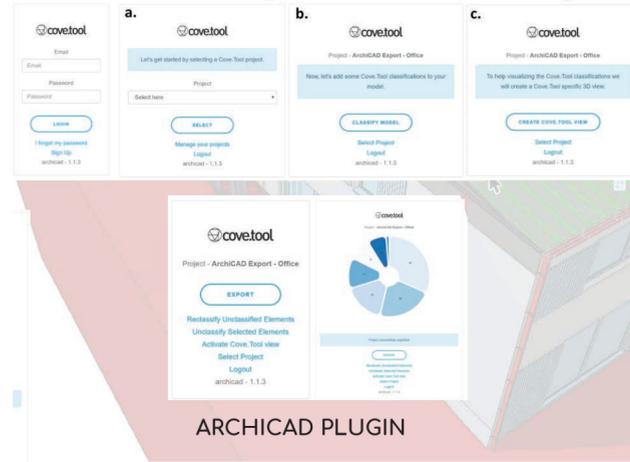
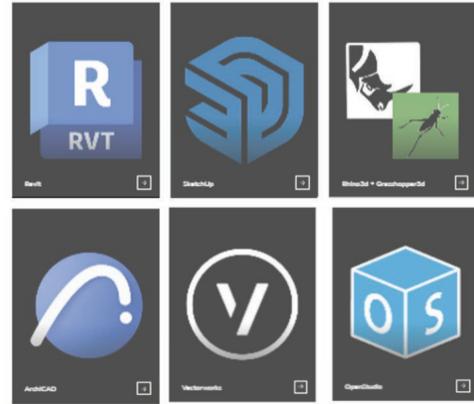
Cross-functionality features:
loadmodeling.tool (HVAC system sizing tool)
Embodied & Operational Carbon Tool
Assembly Builder Tool

Target Audience:
Architects and Designers
Mechanical Engineers.

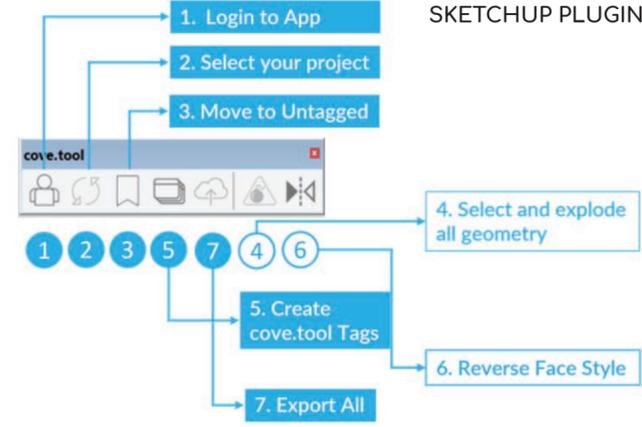


drawing.tool
UI/UX Design Prototyping

3D PLUGIN DEVELOPMENT



ARCHICAD PLUGIN



SKETCHUP PLUGIN

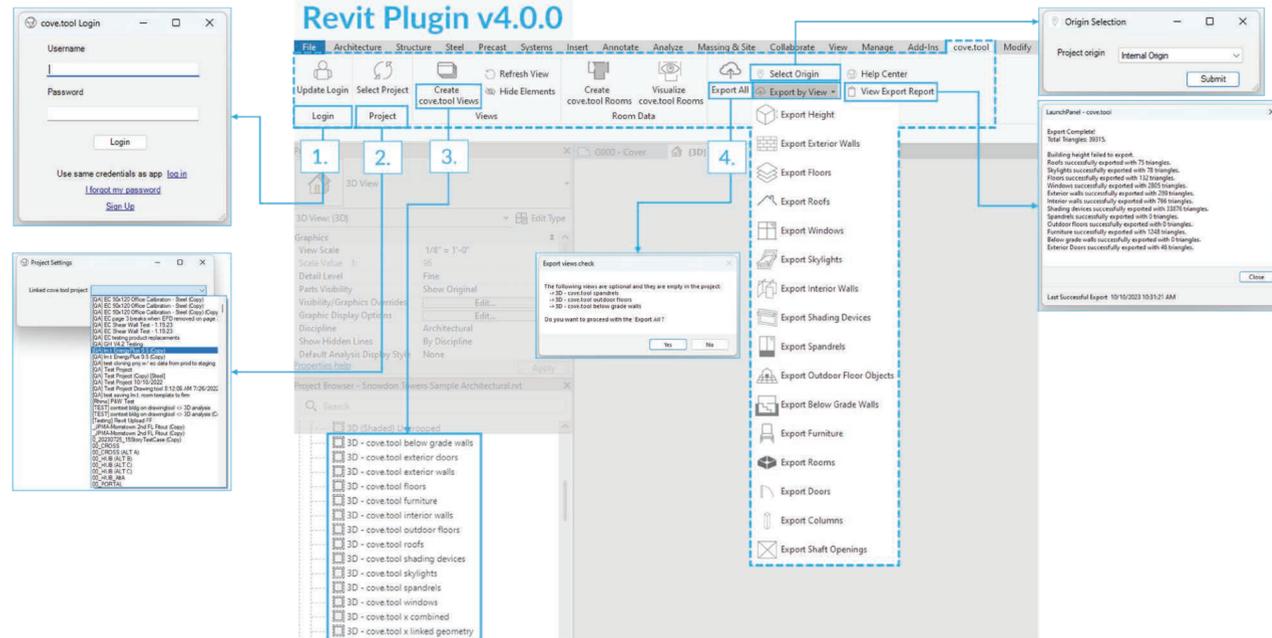
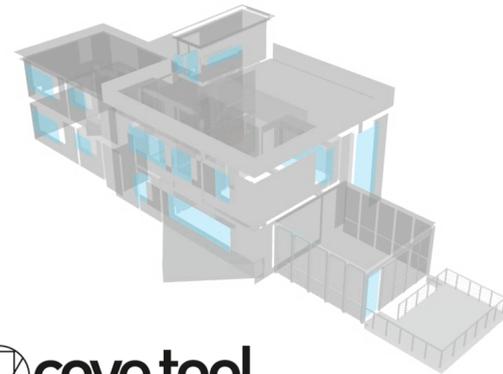
REVIT PLUGIN VERSIONS 2.4, 3.0, 4.0

Feature Planning and Implementation

Version 4.0 - Revamped UI ribbon menu, Hide elements on selection, Visualize 3D rooms and export doors, shaft openings and columns.

Version 3.0 - Refresh 3D Views, Linked Models, and Mesh Triangulation data on export.

Version 2.4.0 - features, exporting 3D geometry from grouped objects, nested families, Room data export, and curtain walls



Cove Tool, Inc
BIM Technology - Product Development

Locate: Building information + geometry visualization.
Organize & Tag: Metadata of project and tagging
Inspect: Inspect building assets by area, properties and materials, in one place.
Integrate: with drawing.tool, assembly.builder, load.modeling and carbon.tool.

Building Information

Use the cove.tool plug in or upload an IFC file

Import

File Source	File Size	Use Type
Revit	5.15 MB	Retail
SketchUp	5.15 MB	Apartments
Revit	5.15 MB	Office

cove.tool Views

Views	Quantity	Unit
Below Grade Walls	1,000,000,000	SF
Retail	500	SF
Apartments	500	SF
Floors	1,000	SF
Outdoor Floors	0	SF
Roofs	12,000	SF
Skylights	1	Ea
Exterior Walls	10,000	SF
Windows	100	Ea
Spandrels	50	Ea
Shading Device	0	Ea
Interior Walls	0	SF
Furniture	0	Ea
Rooms	15	Ea

Bill of Materials

Review your model-driven assemblies and quantities

Uniformat ID	Assembly Description	Quantity	R/U-Value	E.C. Value	Building Use
A1030	Slab on Grade				
A1030-SOG01	12" Concrete Slab on Grade	4,000 SF	5.31	5.31	Classroom
A2020	Basement Wall				
A202010-W0001	Basement Wall Type 1	1,680 SF	18.10	18.10	Classroom
B1010	Floor Construction				
B101010-SOD01	Slab on Metal Deck, Type 1	7,000 SF	5.23	5.23	Classroom
B101010-SOD02	Floating Slab, Type 3	667 SF	4.07	4.07	Office
B2010	Exterior Wall				
B201010-W007	Metal Panel Wall Type 1	1,210 SF	20.4	20.4	Classroom
B201010-W008	Metal Panel Wall Type 2	2,822 SF	21.3	21.3	Office
B2020	Windows				
B202010-WIN001	Casement Windows 48"x60"	13 Ea	2.2	2.2	Classroom
B202010-CW001	Curtain Wall Type 1	1,613 SF	2.1	2.1	Classroom
B202010-CW002	Curtain Wall Type 2	672 SF	2.5	2.5	Office
B3010	Roof Covering				
B301010-R0001	Metal Roofing Type 1	3,300 SF	30.2	30.2	Classroom
B3020	Roof Openings				
B302010-SKY01	Skylight 36"x48"	2 Ea	2.5	2.5	Classroom

Geometry Preview



geometry 2.0
UI/UX Design Prototyping

Project: AMRIT OCEAN RESORT & RESIDENCES

Amrit Ocean is comprised of two towers, a 19-story Tower P (Peace) and an 18-story Tower H (Happiness). Housing 351 units, of which 182 will be luxurious two-bedroom residences and the remainder are hotel rooms.

The residences range in size from 1,465 sq. ft. to 3,390 sq. ft., not including terrace space, and feature a variety of two-bedroom floor plans, some with dens..

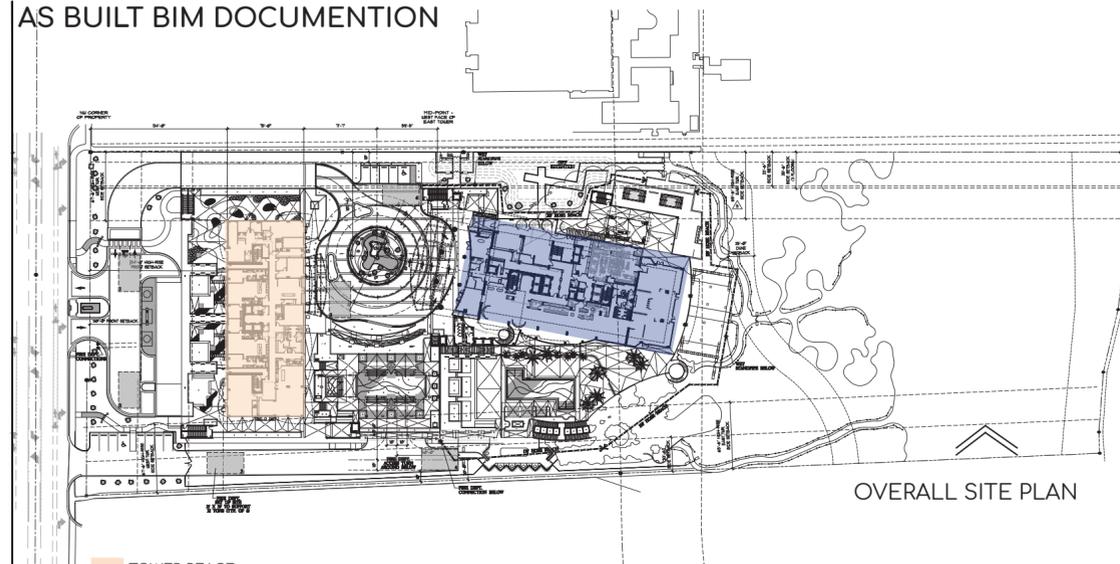


Location: 3100 N Ocean Dr, Riviera Beach, FL 33404
Site Area: 7-acre plot on Singer Island, FL
Amenities: Resort, Wellness spa

Project Team:

GENERAL CONTRACTOR: Optimal Construction, LLC
INTERIOR DESIGNER: Bilkey Llinas Design
PRINCIPAL ARCHITECT: S & E Architects
BIM COORDINATION: Essact Project Management LLP
LIGHTING DESIGNER: MW Harris Lighting Studio
LANDSCAPE DESIGNER: Cadence
SALES & MARKETING: Compass Development

AS BUILT BIM DOCUMENTATION



OVERALL SITE PLAN

TOWER PEACE
 TOWER HAPPINESS



3D MASS MODELING

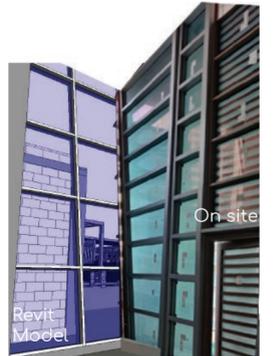
BIM will be used for the following uses on this project:

- a. Visualization
- b. Design Authoring
- c. 3D Coordination
- d. As built condition documentation & Modeling:

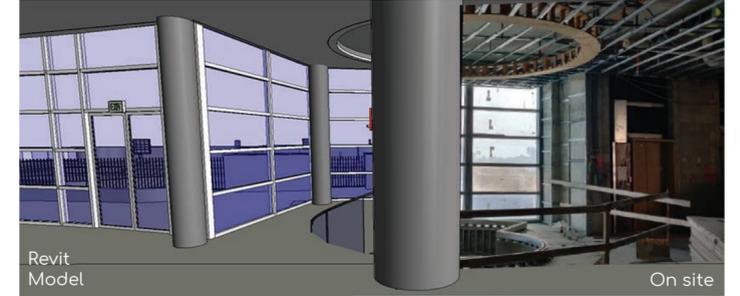
ARCHITECTURE DETAILING:

**Site Visit: TOWER H
 November 11th 2020**

- Site construction status coordination with bim model.
- Drywall paneling stud laid out
- HVAC system network installed
- Piping and ductwork to continue
- Flooring to be laid out.



On site



Revit Model

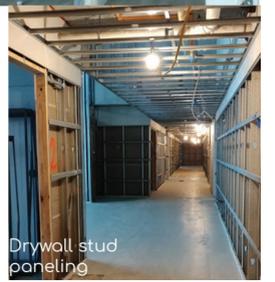
On site

Site Visit: TOWER P

- Drywall, fixtures, flooring completed in model unit
- All levels flooring & finishes to be completed.
- LEVEL 3 partition walls & HVAC ductwork in progress.



Model Unit



Drywall stud paneling

EXPLORING THE INTEGRATION OF IOT AND SPATIAL DATA VISUALIZATION

Smart Campus team members to work with the latest tools for visualization of built environment systems (i.e., GT buildings, infrastructure, campus layout, etc.,)

Investigate to create an engaging form of representation to overlay campus spaces with various types of data sets regarding their use by humans and the loads and performance of energy and water systems.

Example: Kendeda Living Building (KBISD) : ASDL will have access to massive amounts of data from KBISD and will need systems to ingest, analyze, and visualize it.



The Kendeda Building FOR INNOVATIVE SUSTAINABLE DESIGN

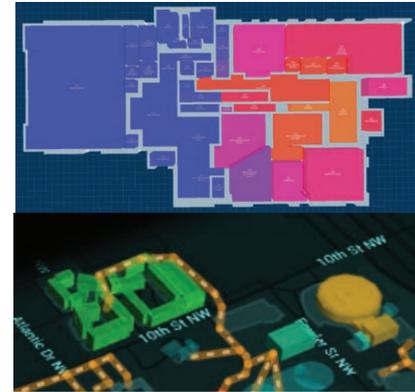
Renderings: Lord Aeck Sargent



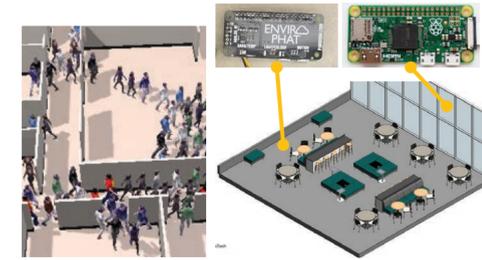
GT Smart Campus – Merging Campus Data with 3D Visualization AEROSPACE SYSTEMS DESIGN LABORATORY

The ASDL team uses RaspberryPi / PiZero devices and sensors as building blocks to create IoT sensors to be deployed into the Living Building.

Configure these devices to create data that will be used to help better understand of the behavior of the campus community and the infrastructure serving it.



Georgia Tech | ASDL | Dr. Woongje Sung



Georgia Tech | ASDL | Dr. Woongje Sung

FRAMING OF A STUDY:

- Clarify how to use visuals to understand operations data.
- Assess the capability of existing tools for an elaborate BIM: KBISD
- Understand the workflow of using BIM and overlaying data
- Use Case: Understanding space use based on data, e.g.: People counters.
- Environmental signatures: indoor CO2 levels.
- IoT-based motion sensors.

Space use Utilization studies



Occupancy flow maps



Spatial-temporal movement



Campus Transportation



Safety evacuation plans



Climate emergency evacuation plans



Data for Visualization

- Thermal data
- Motion sensor data
- Occupancy flow
- HVAC performance data
- Lighting levels
- Pressure data
- Water supply systems
- Indoor air quality

BIM? As the host platform(Database):
- The most efficient and user-friendly interface to represent the campus spaces.

- Overlay sensor data as a spatial layer on the existing spaces.

- Foundational Research in Integrated Building Internet of Things (IoT) Data Standards

(Xinghua Gao, Ph.D. Candidate; Shu Tang, Ph.D. Candidate; Dr. Pardis Pishdad-Bozorgi, Ph.D. Assistant Professor, School of Building Construction; and Dennis R Sheldon, AIA Ph.D. Associate Professor, Director, Digital Building Laboratory)

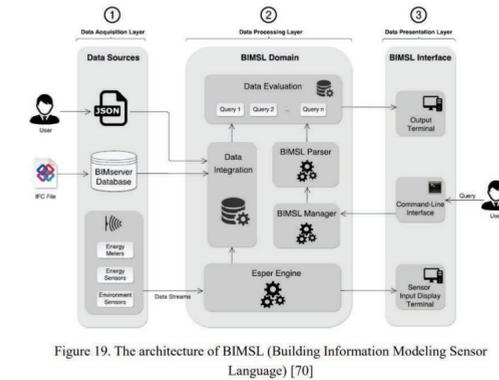


Figure 19. The architecture of BIMSL (Building Information Modeling Sensor Language) [70]

Potential dashboard view:

- Develop a web-based tool for campus building visualization and representation of sensor data.
- Filtering through time and building systems to be reflected in visualization.

Revit Model
Existing Revit model of Kendeda Building. Filter out necessary parts of model (Walls, floors, curtain panels, partitions, HVAC ducts)



CSV Temperature fed into Dynamo

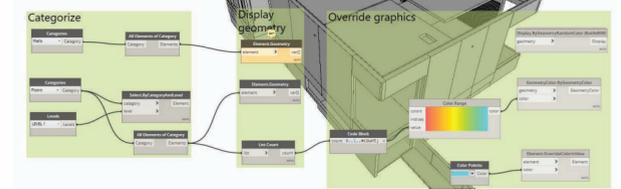
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2020-02-09 00:00:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 00:15:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 00:30:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 00:45:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 01:00:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 01:15:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 01:30:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 01:45:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 02:00:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 02:15:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 02:30:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 02:45:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 03:00:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 03:15:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 03:30:00 EST	75.7°F	75.7°F	69.9°F	74.1°F
2020-02-09 03:45:00 EST	75.7°F	75.7°F	69.9°F	74.1°F

Linked Revit Temperature Schedule

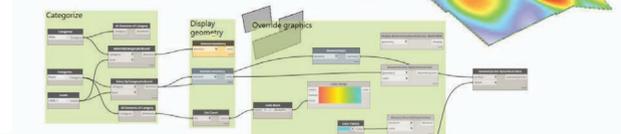
<ROOM DATA_TEMPERATURE>				
A	B	C	D	E
Number	Name	Terminal Unit Number	Temperature	Humidity
190	CLASSLAB	Kendeda DTU_01_0001 2h1T	71.038397	
194	OPEN OFFICE (CENTER)	Kendeda DTU_01_0003 2h1T	71.703003	
191	LOBBY DISPLAY	Kendeda DTU_01_0004 2h1T	70.804398	
192	SMALL CONFERENCE	Kendeda DTU_01_0005 2h1T	73.529999	
190	CONFERENCE	Kendeda DTU_01_0008 2h1T	71.038397	
118	SEMINAR	Kendeda DTU_01_0007 2h1T	71.703003	
130	INNOVATION LEARNING AREA	Kendeda DTU_01_0008 2h1T	70.804398	
130	COLLABORATION AREA	Kendeda DTU_01_0010 2h1T	73.529999	
131	BRANCAVILLI	Kendeda DTU_01_0012 2h1T	73.796402	
110	MAKERS SPACE	Kendeda DTU_01_0014 2h1T	73.796402	
200	CLASSLAB	Kendeda DTU_02_0001 2h1T	72.400397	
208	CLASSLAB	Kendeda DTU_02_0002 2h1T	73.724297	
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201	QUIET STUDY	Kendeda DTU_02_0004 2h1T	71.724	
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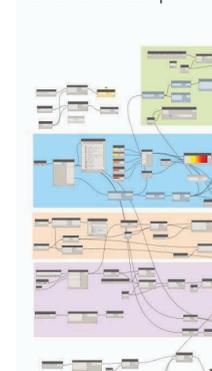
Extracted Revit Model



Graphics Overlay mapping



Temperature trends over timestamp



Spring 2020-Fall 2020
Aerospace Systems Design Laboratory
Georgia Institute of Technology

Analyzing built environment footage visual data to understand human behavioural movement, lingering and spread of the virus through particles suspended in the air.

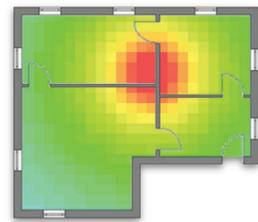
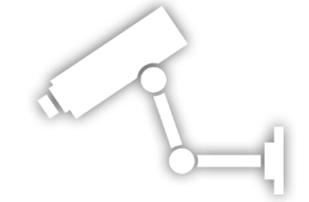
VISION

Develop AI-based computer vision models/programs, to use the camera feed data & train the program to recognize factors such as the distance between people.

Utilize computer vision techniques to detect instances where social distance requirements are being violated

Create an informative tool where building operators can quantify the level of adherence to a particular implemented strategy

The main metric we propose to introduce is "Lingering" which looks at different spots within the spatial configuration of the room and studies the time subjects spend in the same spot

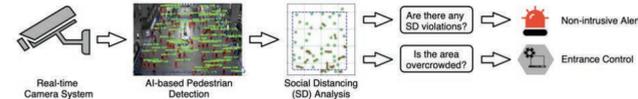


CASE STUDIES:

1. A Vision-based Social Distancing and Critical Density Detection System of COVID-19

- An AI and monocular camera based real-time system to monitor the social distancing protocol violation
- Use the system to analyze the relationship between number of social distancing protocol violation and social density in different scenario
- Use the linear regression model to compute a critical social density value for each scenario and hence avoid transmission of virus in overcrowded environment by controlling the social density

https://www.researchgate.net/profile/Ekim-Yurtsever/publication/342763051_A_Vision-based_Social_Distancing_and_Critical_Density_Detection_System_for_COVID-19/links/5f08fbd9c92851c52d428c8eb/A-Vision-based-Social-Distancing-and-Critical-Density-Detection-System-for-COVID-19.pdf



2. Social Distancing Monitoring and Infection Risk Assessment in COVID-19 Pandemic

- The proposed model includes a YOLOv4-based framework and inverse perspective mapping for accurate people detection and social distancing monitoring in challenging conditions, including people occlusion, partial visibility, and lighting variations.
- A 3-stage model including people detection, tracking, inter-distance estimation as a total solution for social distancing monitoring and zone-based infection risk analysis

<https://www.medrxiv.org/content/10.1101/2020.08.27.20183277.v1.full.pdf>

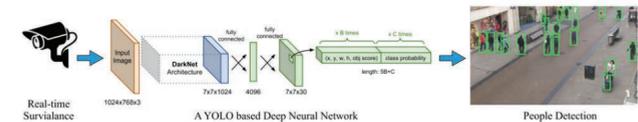


Figure 3. Stage 1 - The overall structure of the people detection module.

```

1 import cv2
2 import pandas
3 from datetime import datetime
4
5 first_frame = None
6 status_list = [None, None]
7 times = []
8 df = pandas.DataFrame(columns=["Start", "End"])
9
10 video = cv2.VideoCapture(0) # record videocapture with webcam
11 while (True):
12     check_frame = video.read()
13     status = 0
14     gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY) # convert frame color to grayscale
15     gray = cv2.GaussianBlur(gray, (21,21), 0) # convert grayscale frame to gaussian blur
16
17     if first_frame is None: # stores the very first frame of the captured video
18         first_frame = gray
19         continue

```

```

1 while frame = cv2.imread(first_frame, gray) # record the first frame of the video
2 thresh_delta = cv2.threshold(delta, 30, 255, cv2.THRESH_BINARY)[1] # convert a threshold value, in that diff. value > 30 is converted to
3 thresh_delta = cv2.dilate(thresh_delta, None, iterations=1) # convert a threshold value, in that diff. value > 30 is converted to white
4 cnts = cv2.findContours(thresh_delta, cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_SIMPLE) # define number area, eventually, add borders
5
6 # loop for counting
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100 # loop for counting

```

RESEARCH METHODOLOGY



LITERATURE REVIEW
Extensive literature review to identify current state of research



SOFTWARE TOOLS
Identify tools and preset libraries that can expedite the process of detection



TEST CV MODEL:
Conduct preliminary testing on successful detection of human subjects



DATA COLLECTION:
Conduct footage gathering process



EXECUTION:
Calibrate the tool through testing different thresholds and identifying potential limitations.

COMPUTER VISION MODEL

Open CV library:
Algorithms used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects etc.

EVALUATION CRITERIA:

Location : Common areas, public spaces and corridors.

Threshold Value: Appropriate threshold values that approximate the 6ft generally accepted social distance

Distance: Test for social distancing measures.

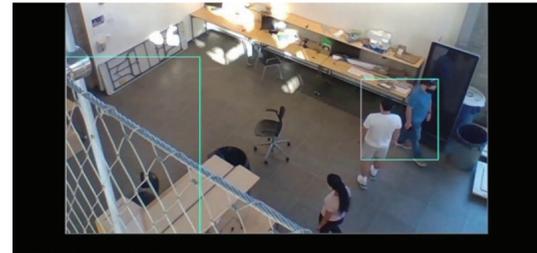
Environmental factors: Lighting Levels, Glare, Color Variation, Vantage Point Altitude



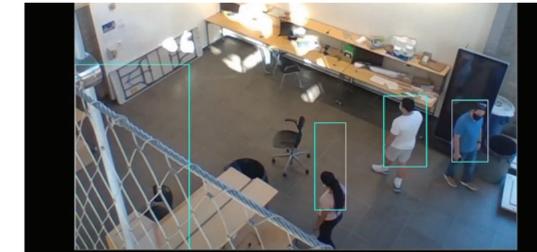
IMPLEMENTATION: PROOF OF CONCEPT



PHASE 1: EACH PERSON IS CAPTURED BY PROGRAM WITH THEIR OWN BLOCKS, INDICATING THEY ARE AT SAFE DISTANCE FROM EACH OTHER



PHASE 2 CONT.: AT THIS MOMENT YASSER AND ZIRUI ARE TOO CLOSE TO EACH OTHER THAT THE PROGRAM INDICATES THEY VIOLATE THE SOCIAL DISTANCING PROTOCOL BY INCLUDING THEM IN ONE BLOCK



PHASE 3: NOW THEY RESUME A SAFE DISTANCE APART, PROGRAM INDICATES THEY OBEY SOCIAL DISTANCING PROTOCOL BY IDENTIFYING THEM AS SEPARATE BLOCKS

INFERENCE:

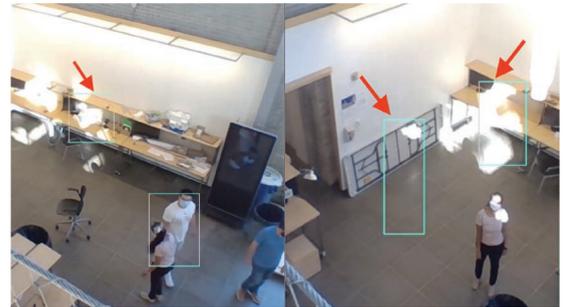
This tool can be utilized in different applications that include:

- In a research capacity identifying peoples' adherence to social distancing guidelines in a space
- In a practical manner by the immediate intervention in cases of repeated violations
- Creation of maps that can spatially and temporally identify hotspots of violations or lingering

LIMITATIONS:

1. LIGHT/GLARE

- The program tends to be oversensitive to light/glare
- Occasionally mistakes light/glare as moving objects.
- Light/glare interferes with the object recognition, it is harder for the program to capture the actual moving objects (people)



2.SENSITIVITY



- The program recognizes the metal fence as a moving object because people walking on that floor causes the floor/metal fence to vibrate mildly

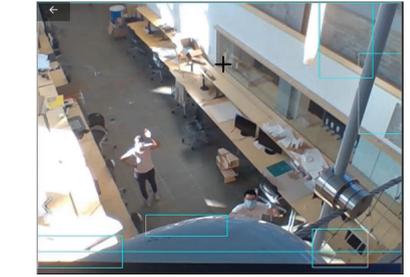


- The program seems to be able to better capture objects with colors that strongly contrast the background (e.g white)

3. ANGLE/PERSPECTIVE



- In cases where the camera was set on a horizontal plane to the subjects the camera would erroneously identify all subjects as being in violation indicating a perspective problem

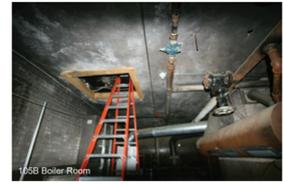
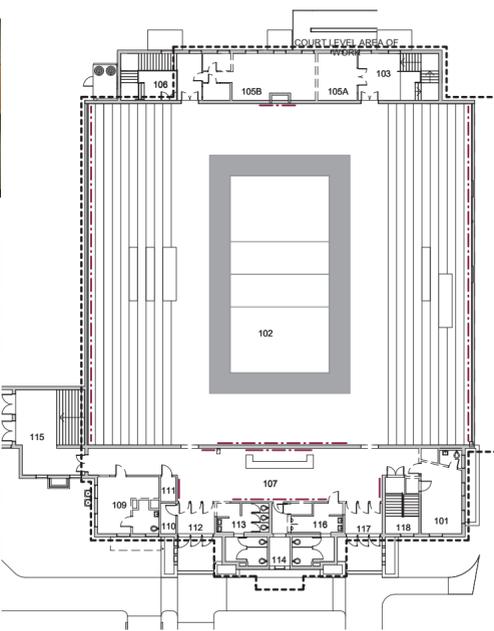


- Initial testing in different vantage points yielded varying results with subject identification regard to angle of the camera.



O'Keefe - Main Bldg, Atlanta, GA 30313

O'KEEFE GYMNASIUM EXPANSION



NON-ATHLETICS
EXISTING GRAPHICS

CONCEPTUAL MASSING



INTERIOR VIEW VIP LOUNGE 1
SOUTH SIDE



INTERIOR VIEW VIP LOUNGE 2
NORTH SIDE



EXTERIOR FACADE
REAR END



SOUTH FACADE



View from Hub



View from Proposed Campus Center



PROPOSED
CAMPUS CENTER

Architects: Cooper Carry

Garage proposed for the 1930 Ford Model A Sport coupe that serves as the official mascot of the student body at Georgia Institute of Technology.



View from South Entrance



View from Parking Lot

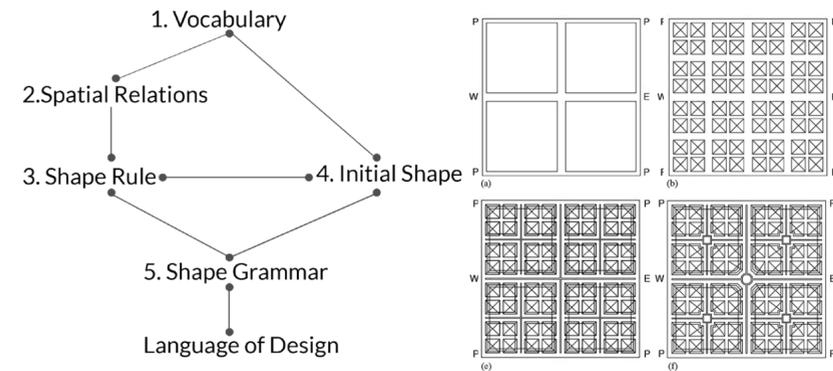
THE REVERSE ISOVIST

Study of Shape Grammars:
an area of study that views architectural drawing as a formal logic of geometric shapes.

Father of Shape Grammars: **George Stiny**

Algebras of shapes and labeled shapes;
Spatial relations and shape rules;
Transformations and shape rules;
Determinacy and indeterminacy of rule applications;
Shape rules and rule schemata.

A host of applications in architectural, industrial and mechanical design as well as visual and decorative arts.

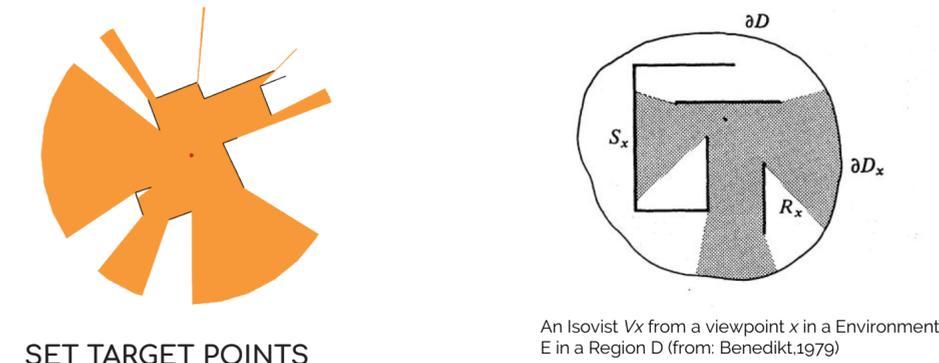


 The new shape grammar interpreter, the shape machine, designed & created by the Shape Computation lab at Georgia Tech
<http://shape.gatech.edu/>

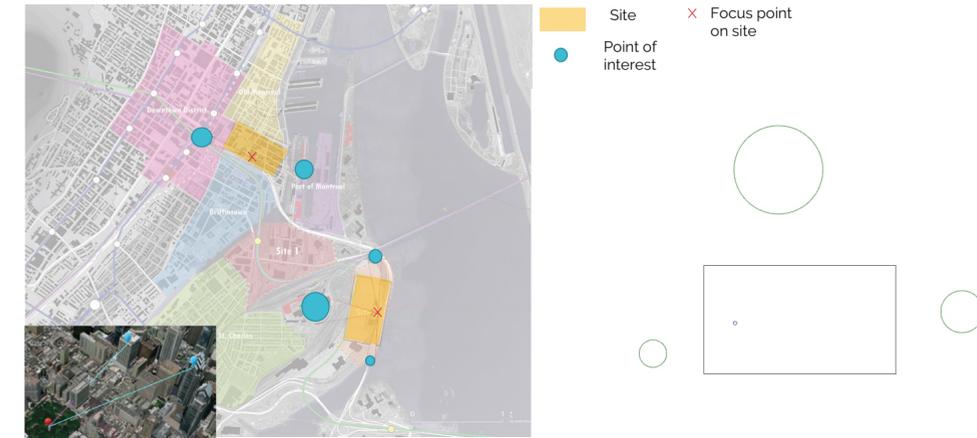
THE REVERSE ISOVIST

Isovist: ML Benedikt
An Isovist (view field) contains all points which can be seen from a location in space. Proposing a reversal in this process of view perception facilitates the method to obtain view angles from select vantage points of interest around the focus site.

This project investigates the reverse isovist approach to obtain optimum views in an urban design setting and its use in urban administration.



SET TARGET POINTS



SHAPE RULES

1. SET TARGET POINTS



2. CREATE GRID POINTS



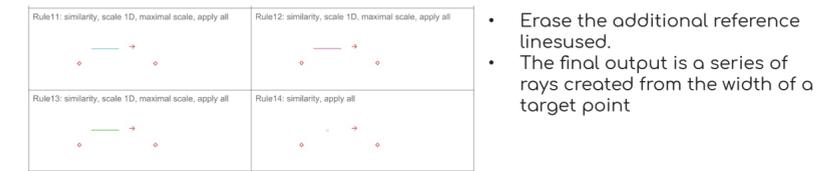
4. CREATE A PLANE FOR TARGET VIEWS



5. SET MARKERS EDGE TO SNAP



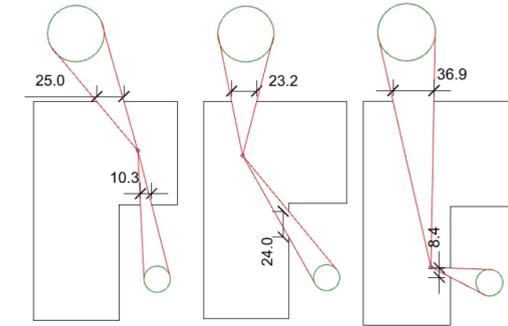
6. FIND EDGES AND FIELD OF VIEW



SHAPE MACHINE INTERPRETATION

POSITION VARIATIONS

- Change in position of focus point within site to achieve most desirable view angle to both the target points.
- Can be implemented to achieve ideal furniture placement layouts towards optimum views.
- Create options for glazing and façade designs.



- Create points on the circumference of target width.
- Get opening angle and clear width.

GEORGIA TECH: As-built modeling

Building name:
Enterprise Resource Planning Georgia Tech

Address: 755 Marietta St NW, Atlanta, GA 30318
Project: Renovated Interiors 2017
Space use:

- Collaborative office space.
- Multiple conference meeting spaces



Collaborative model workflow DOCUMENTATION:

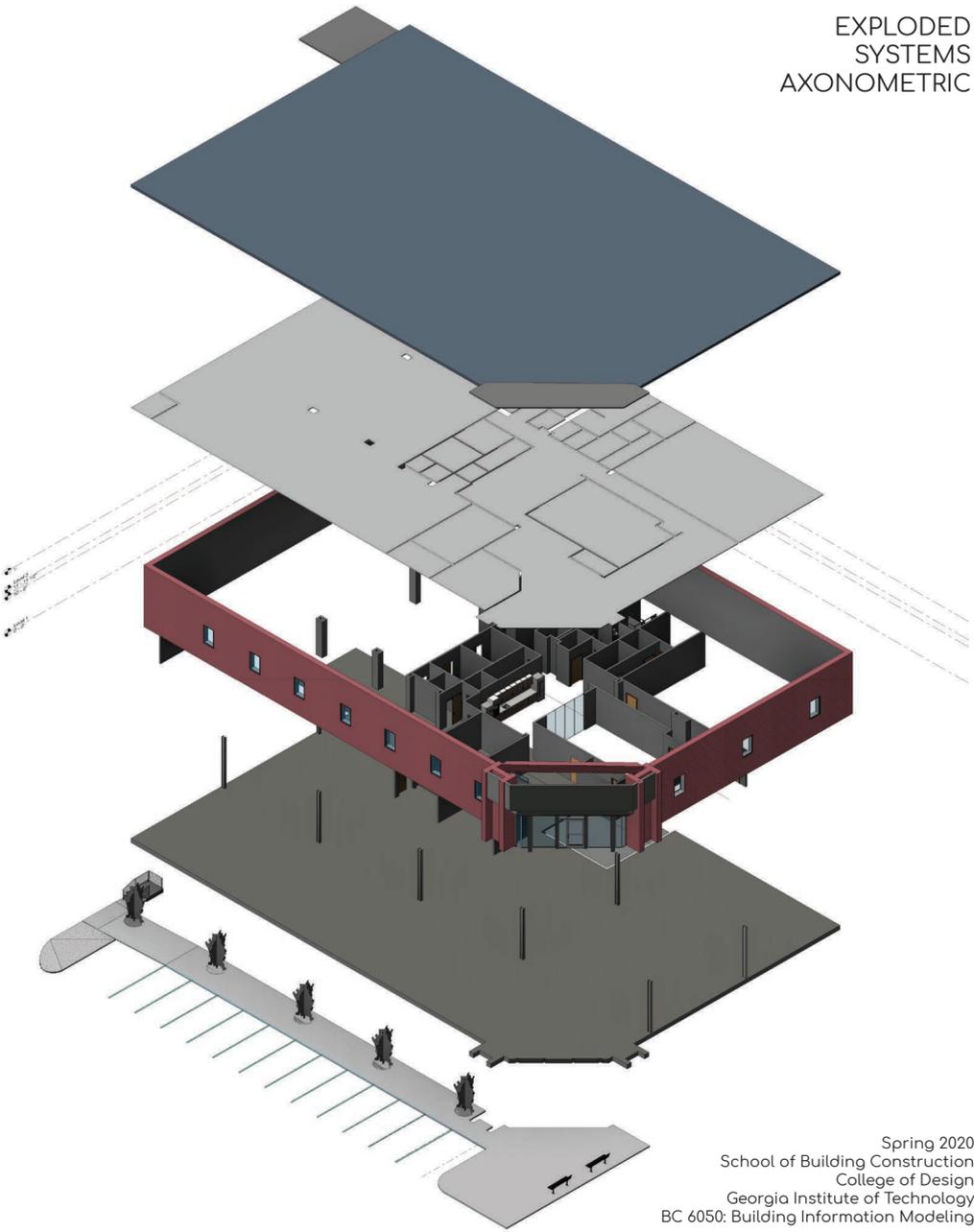
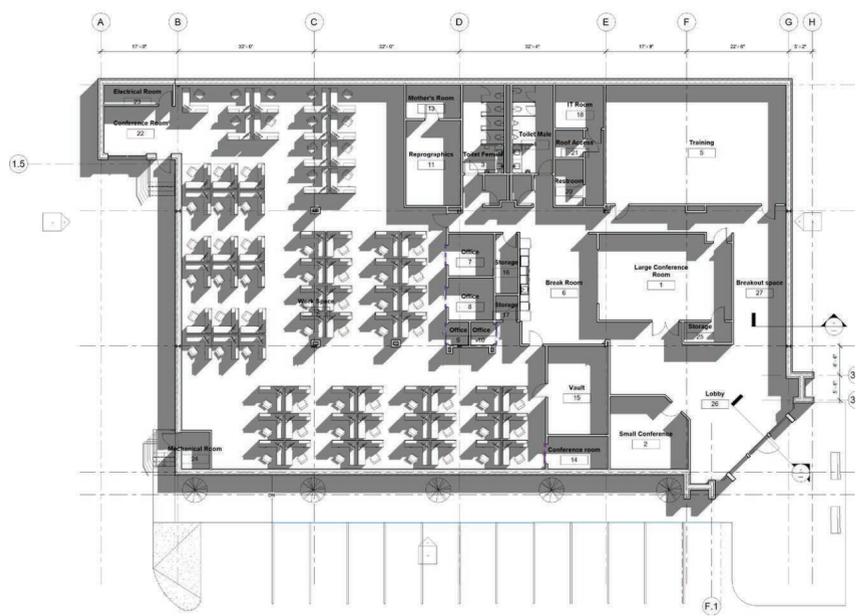
- Ground Square-Footage: 12,420
- Sprinklered: Yes
- Floor to Floor Height: 14'
- Typical Column Sizes: Steel Column Wide Flanged (6"x6")
- Exterior Wall Type: Brick Masonry
- Interior Wall Types: Metal stud 3 5/8" on drywall
- Typical Door Heights and Types: 8' (Entrance and conference) 7' (Others)
- Typical Door Hardware Types: Schlage L9000 Series, 4 hinges
- Typical Door Species: Oakwood door (book matched) Flush Door



EXTERIOR VIEWS

- Site visit and photo documentation
- Building documentation (As built condition)
- Grid lines & Structure
- Interior walls and Doors
- Floors / Ext Walls / Windows / Curtain Wall
- Toilets / Casework
- Stairs / Elevators / Room Names & Numbers
- Reflected Ceiling Plan
- Site features
- Roof

FLOOR PLAN



EXPLODED SYSTEMS AXONOMETRIC



The Enterprise Portfolio



Storefront System Type and Manufacturer:	Access controlled door with concealed overhead controller
Storefront Mullion Typical Sizes:	2"x4" mullion
Exterior Window Types:	Double glazed pane with insulation
Insulated Glazing:	Yes
Typical Restroom Fixtures: Vanities: Water Closets- Urinals- Sinks-	Engineered stone slab Wall mount fixture, American Standard Wall mount, American Standard Undercounter sink, American Standard
Trash Receptacle Type:	5 stream receptacle unit
EWC type:	Bottle type with compressor



BUILDING INFORMATION MODELING

kiran golla | zeyue zhang | udiksha nagarak kapini



LOCATION: ATLANTA, GEORGIA STATE, USA



PROJECT BRIEF:

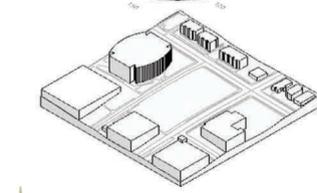
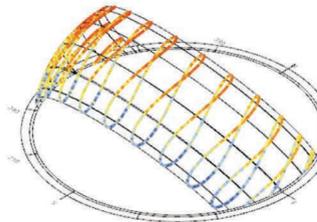
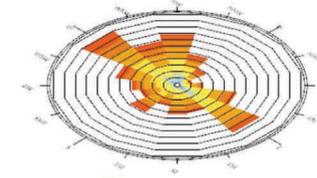
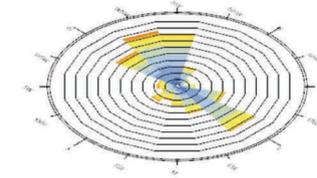
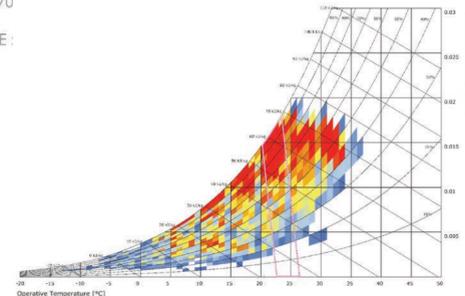
SECONDARY SCHOOL

- 6 classrooms
- 1 teacher's Lounge
- 1 Admin office
- 2 restrooms
- Circulation spaces

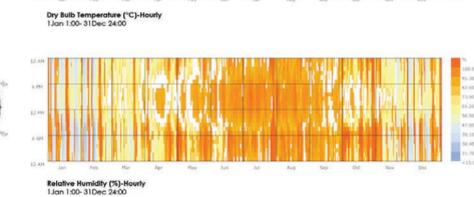
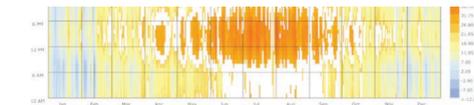
SITE DETAILS :

- LATITUDE : 33.781145,
- LONGITUDE : -84.399467
- GEORGIA TECH CAMPUS 10TH STREET NW
- AREA : 570
- LANDUSE :

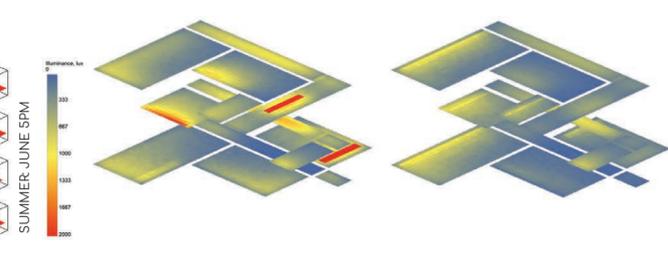
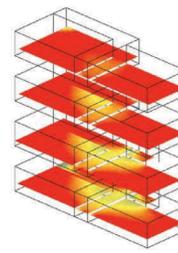
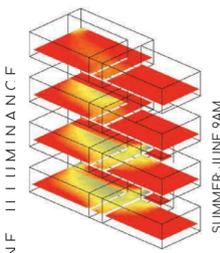
PSYCHROMETRIC CHART



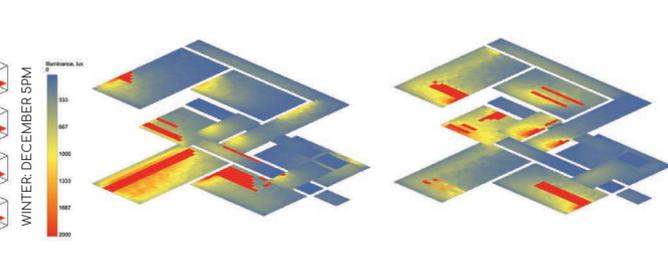
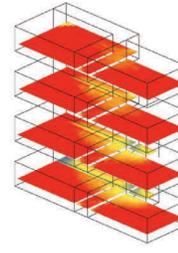
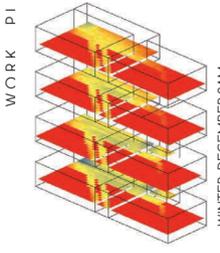
ANNUAL DRY BULB TEMPERATURE



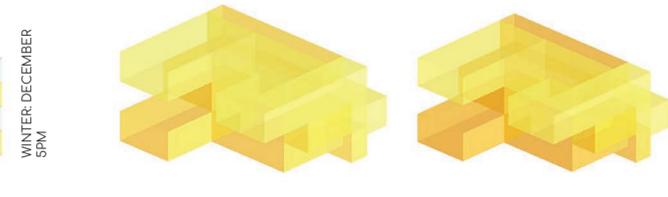
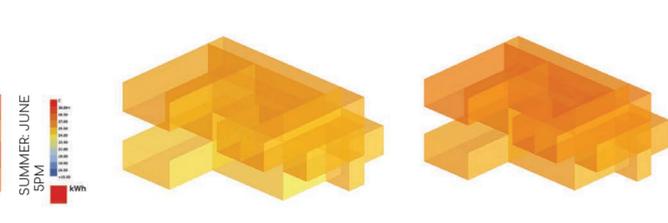
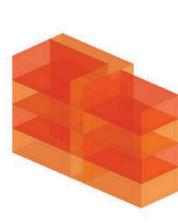
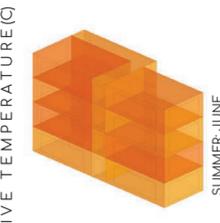
AVERAGE OPERATIVE TEMPERATURE (C)



GRID BASED DAYLIGHTING ANALYSIS



THERMAL COMFORT ANALYSIS



BUILDING PERFORMANCE SIMULATION

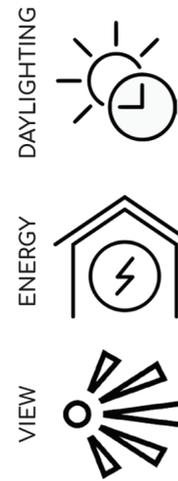
Collaborative multi-performance building analysis of the **Drew Charter School, Atlanta**

Evaluate design options for multiple objectives, analyze and visualize data, extract the insights, and formulate guidelines for design

Domains:
 Parametric Modeling, Energy Use, Daylighting, View Analysis, CFD: Air Flow and Ventilation, Data Visualization & Optimization



OBJECTIVES:



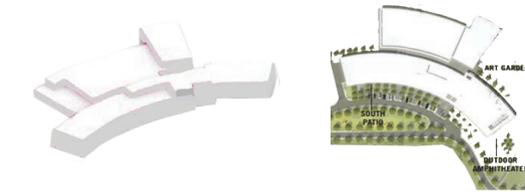
PARAMETERS:

- Avg Daylight factor
- % area DLF
- Spatial Daylight Autonomy (SDA)
- Annual Sun Exposure (ASE)
- Useful Daylight Illuminance (UDI)
- Heating load
- Cooling load
- Site energy/Energy Use Intensity (EUI)
- Visibility area Percentage above 50%



Perkins&Will

CONSTRAINTS:

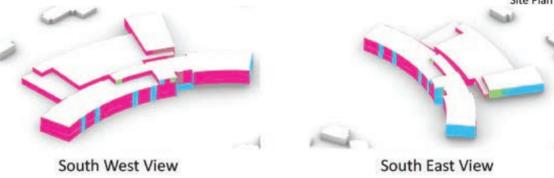
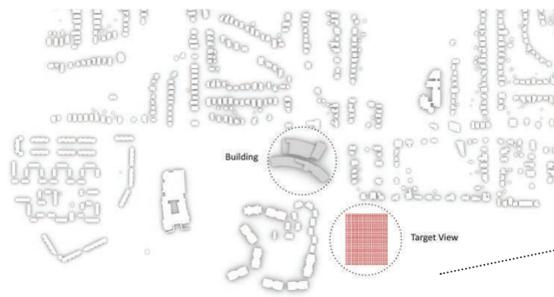


CURVED FORM

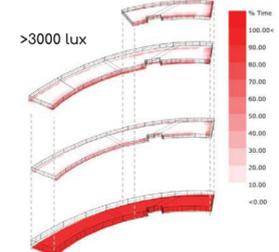
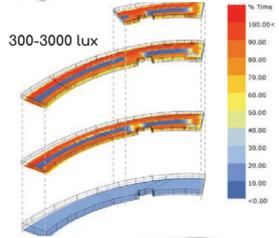
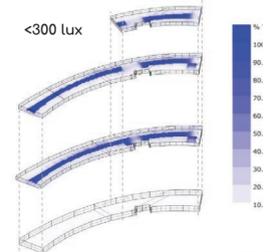
- Maintain the identity of the building.
- Architectural character of the building is preserved.

POSITION

- The placement of the building is kept intact.
- No displacement from its building footprint



DAYLIGHTING:



- PROPORTIONS**
- The height and width of the structure is maintained.
 - No additional floors have been created to account for standard educational space requirements.

DAYLIGHTING:
 Ground floor is overlit. First, second and third floors houses all the classes, labs etc. have the required lux levels between 300 and 3000 lux with an exception for the central corridors which are underlit.

VIEW ANALYSIS



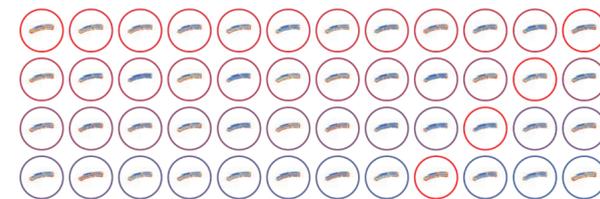
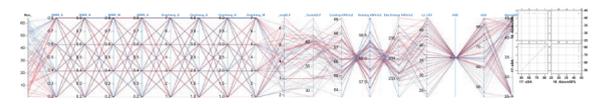
- OBSERVATIONS:**
 The south east view gets the maximum view towards the target area, since it faces it. Although some areas which get a partial view, but most of the structure has almost no view which can be looked into.
 The curvilinear front of the building gets very few patches of 80 -100 which is assumed to be due to its shape.
- Area within 0 -20%: 902m2
 - Area within 20-40%: 229m2
 - Area within 40-60%: 155m2
 - Area within 60-80%: 143m2
 - Area within 80-100%: 1290m2

BUILDING SIMULATION IN DESIGN PRACTICE

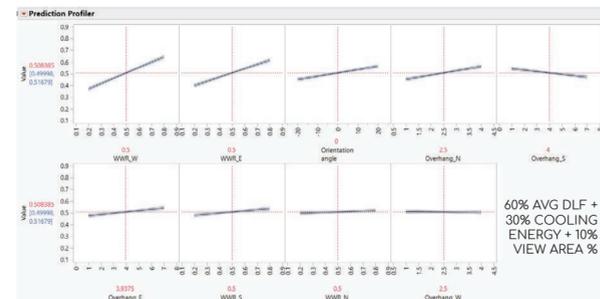
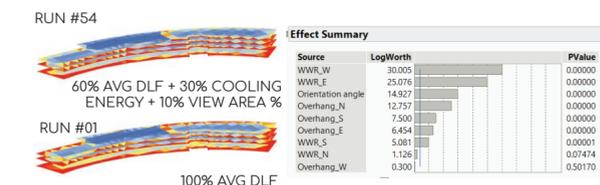
deva shree saini | jayati chhabra | udiksha nagarak kapri

VALUE ASSESSMENT

DATA VISUALIZATION:
Qualitative analysis using PCP
https://tt-ocm.github.io/DesignExplorer/?ID=BL_3b0TeH9



SENSITIVITY ANALYSIS OF INDIVIDUAL INDICATORS AND VALUE FUNCTION



USEFUL DAYLIGHT ILLUMINANCE (UDI)

INFERENCE:

- Require higher Window-Wall ratios than the original except southern façade.
- Along with higher depths of overhangs except for the southern façade.

VALUE FUNCTION BY ASSIGNING WEIGHT PER INDICATOR (PREFERRED FACTORS)

AVG DLF **60%**

- Highest preference to daylighting essential factor for a school.
- Optimised daylighting contributes to reduced energy loads.

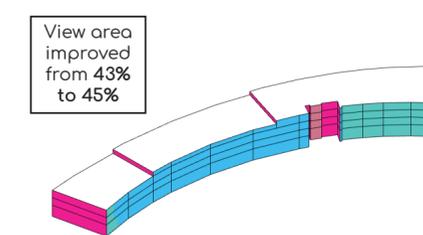
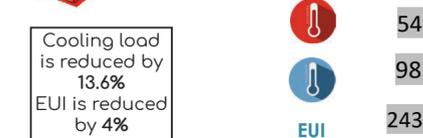
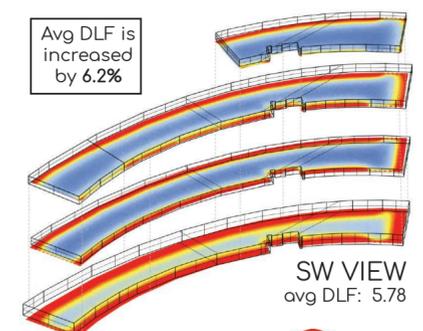
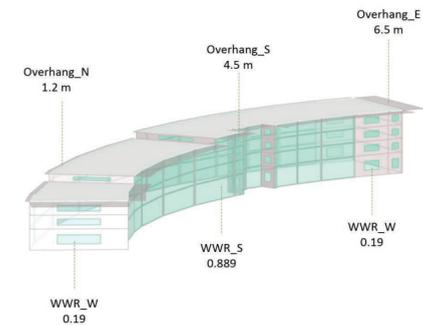
COOLING ENERGY **30%**

- A school must be energy efficient to be economical.
- Maximum day time activities & a climate type of Atlanta, calls for more cooling energy.

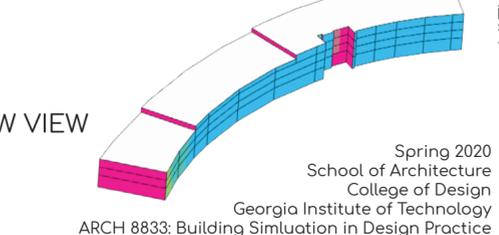
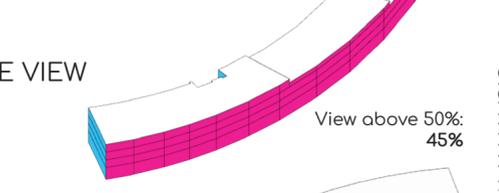
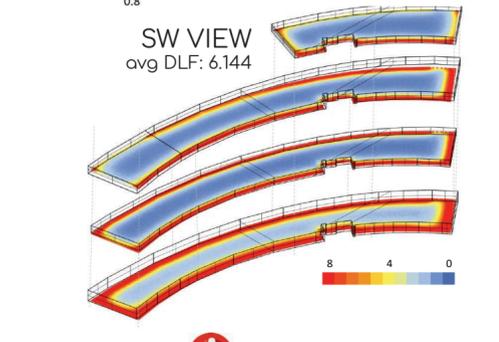
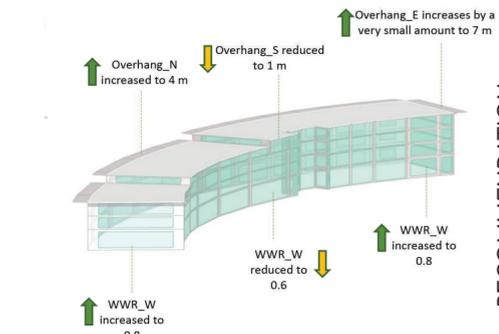
VIEW AREA PERCENTAGE **10%**

- View area can be compromised on in comparison to energy & daylighting.
- With constraints in geometry & orientation angles, only slight increase is observed.

BASE CASE PERFORMANCE



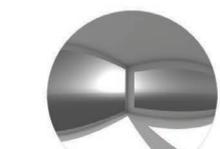
OPTIMISED (60% AVG DLF + 30% COOLING ENERGY + 10% VIEW AREA %) #RUN 54 PERFORMANCE



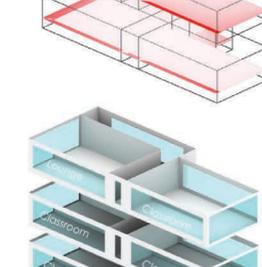
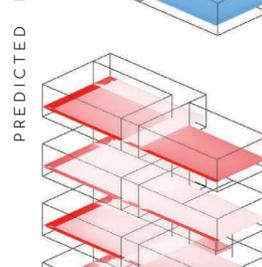
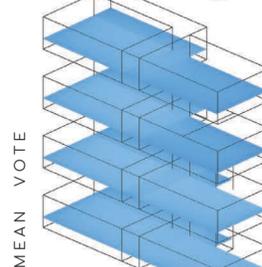
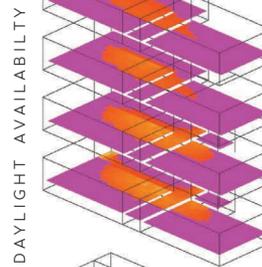
RECOMMENDATION

VIEW ANALYSIS

VISUAL COMFORT ANALYSIS



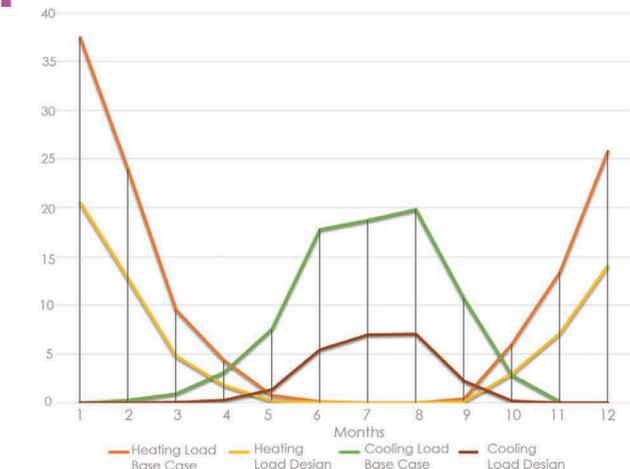
ASHRAE CLIMATE ZONE 3:
Glazing facades ratio:
North: 0.7
West: 0.7
South: 0.6
East: 0.7



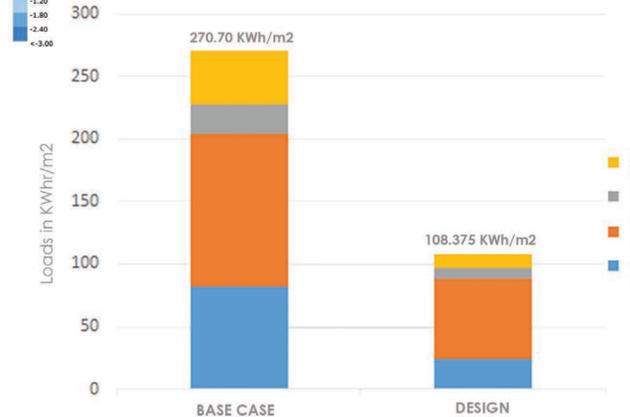
BASE CASE PERFORMANCE

ENERGY PERFORMANCE EVALUATION

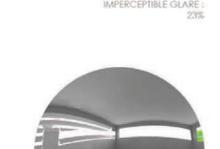
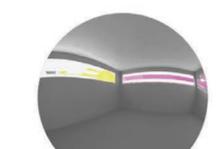
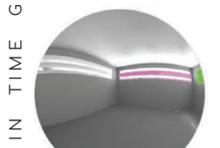
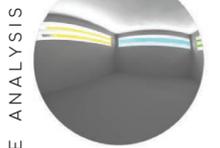
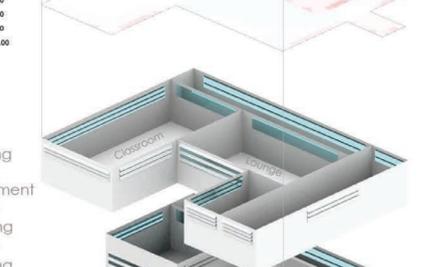
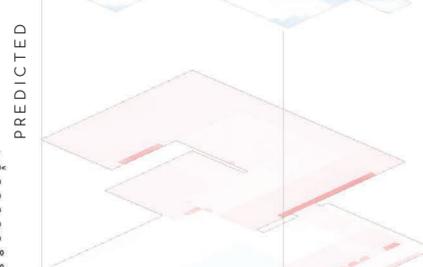
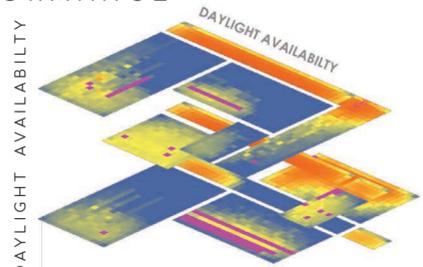
Heating and Cooling Loads



Energy Use Intensity



DESIGN CASE PERFORMANCE



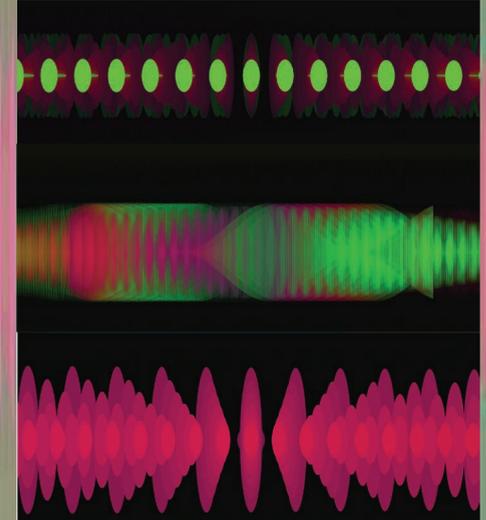
ASHRAE CLIMATE ZONE 3:
Walls: Exterior wall mass
Roof: Exterior roof IEAD semi-heated
Window: Exterior window non-metal
Floor: Attic floor semi-heated

WEB GRAPHICS

processing.js
p5.js

Visualization

- Mouse hover controls to create recursive forms of ellipsoidal shapes and curves.
- Canvas width positioning to obtain varied sizes of ellipses and increasing or decreasing translucency.



Mouse position:
Center of canvas

Mouse control:
Centre to left

Mouse control:
Centre and right

JavaScript Stylesheet

- Wave function: with bar width/height in x and y direction.
function Wave(x, y, barwid, maxhei, amount);

- Fill: Cycling of colors on time :
this.r = map(sin(this.time+this.i/90), -1, 1, 0, 205);
this.g = map(sin(this.time+22.5+this.i/90), -1, 1, 0, 255);
this.b = map(sin(this.time+45+this.i/90), -1, 1, 0, 100);
fill(this.r, this.g, this.b);



WEBSITE SCRIPTING

HTML/CSS

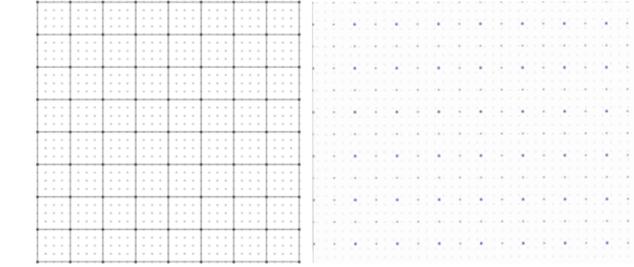
- Website tags using cascading style sheets:
- Hoverable side responsive navigation functions
 - Embedded hyper links
 - Active class to the current element



WEB APPLICATION SETUP:

1. GRID SETUP:

- Building Components Grid : Wall, slab and spaces snaps to this grid
- Furniture Grid: Objects in the furniture library snap to this grid.
- Column Spacing Grid: A customised 10m grid created for columns.



2. ORTHOGRAPHIC VIEWS:

- Camera Angle: Setup 3D perspective camera.
- 2D View Locked, Other Views On click : Change views on tab hover.



3. DOCUMENT UPLOAD:

- Icon for HTML, CSS
- OBJs objects with MTLs materials
- Texture Images JPGs and PNGs

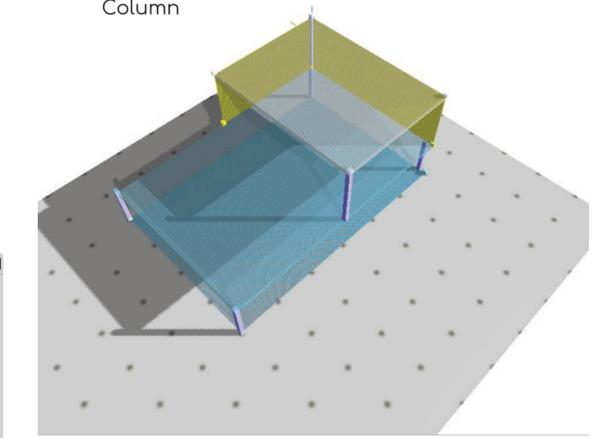
Name	Date modified	Type	Size
examples	12/10/2019 8:12 AM	File folder	
img	12/10/2019 8:12 AM	File folder	
Beefull.mtl	12/8/2019 7:48 PM	MTL File	1 KB
Beefull.obj	12/8/2019 7:48 PM	OBJ File	3,054 KB
BeefKing.mtl	12/8/2019 7:55 PM	MTL File	1 KB
BeefKing.obj	12/8/2019 7:55 PM	OBJ File	3,068 KB
BeefQueen.mtl	12/8/2019 7:51 PM	MTL File	1 KB
BeefQueen.obj	12/8/2019 7:51 PM	OBJ File	3,058 KB
BeefTwin.mtl	12/8/2019 7:44 PM	MTL File	1 KB
BeefTwin.obj	12/8/2019 7:44 PM	OBJ File	3,047 KB
box.mtl	12/9/2019 10:19 PM	MTL File	1 KB
box.obj	12/9/2019 10:19 PM	OBJ File	3 KB
Chair.mtl	11/11/2019 7:41 PM	MTL File	1 KB
Chair.obj	11/11/2019 7:41 PM	OBJ File	12 KB
DeskChair1.mtl	12/8/2019 2:29 PM	MTL File	1 KB
DeskChair1.obj	12/8/2019 2:29 PM	OBJ File	133 KB
DeskChair2.mtl	12/8/2019 8:01 PM	MTL File	1 KB
DeskChair2.obj	12/8/2019 8:01 PM	OBJ File	428 KB
DiningSet.mtl	12/10/2019 7:27 AM	MTL File	2 KB
DiningSet.obj	12/10/2019 7:27 AM	OBJ File	4,873 KB
DrawerHigh.mtl	12/8/2019 10:32 PM	MTL File	1 KB
DrawerHigh.obj	12/8/2019 10:32 PM	OBJ File	136 KB
DrawerLarge.mtl	12/8/2019 6:26 PM	MTL File	1 KB

3D PLACEMAKING WEB APPLICATION

BUILD:

1. ARCHITECTURE/STRUCTURE Drawing 2D/3D

- Linear Element
 - Wall
 - Space
 - Slab
- Point Element
 - Column
- Furniture Element
 - All Furniture Group



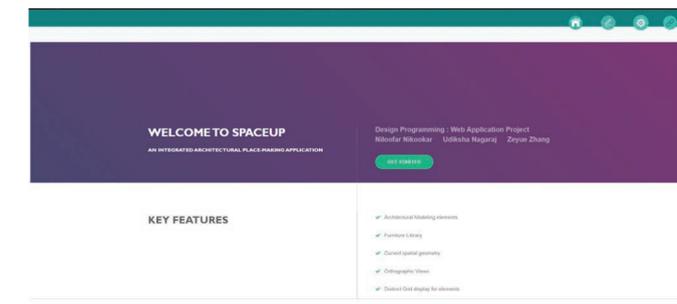
2. INTERIORS: Furniture Elements

- Snap to FurnitureElementGrid
- Upload the OBJs and MTLs that exported from Rhino and SketchUp Files.
- Added under Building Elements Classes



USER INTERFACE:

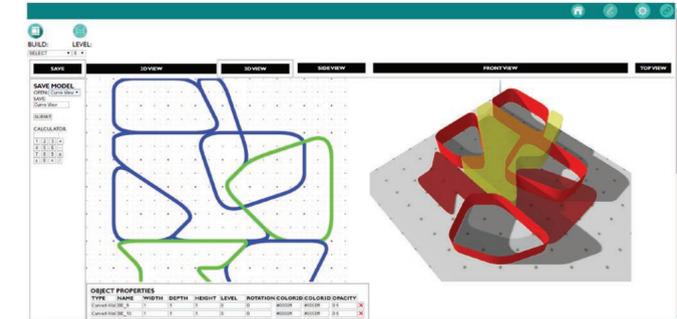
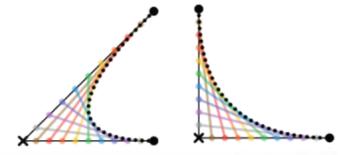
ARCHITECTURE/STRUCTURE



3. CURVED ARCHITECTURAL ELEMENTS

Curve System

- Curved Wall
- Curved slab
- Curved Space
- Bezier Curve
- Curve Point Generator



WEB GRAPHICS BUILDING APPLICATIONS | Design Programming

abdurahman alorabi | niloofar nikookar | udiksha nagarakapini

Fall 2019
School of Architecture
College of Design
Georgia Institute of Technology
ARCH 8833: Design Programming 1
niloofar nikookar | zeyue zhang | udiksha nagarakapini

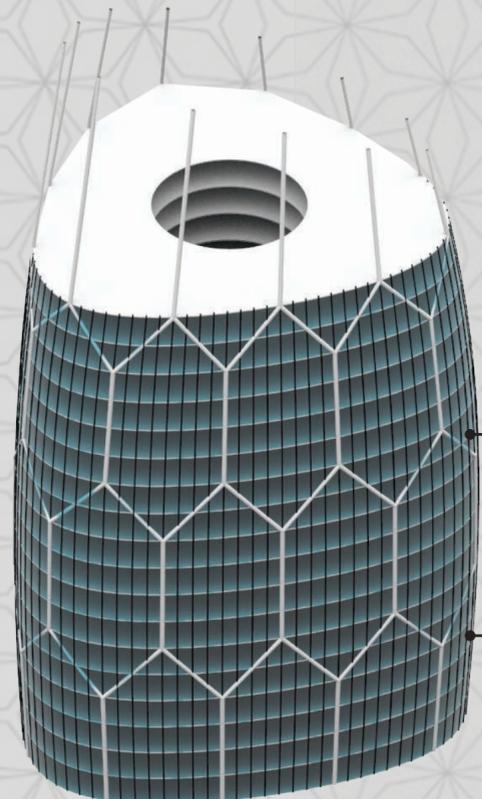
The computational process adopted for this parametric facade study of AL BAHR TOWERS comprises of a transformation of the hexagonal facade to a triangular module facade.

The kinetic transformation of the panel is a response to the sun's position in order to reduce the solar heat gain on the exterior surface.

INTEGRATED SYSTEMS ILLUSTRATION



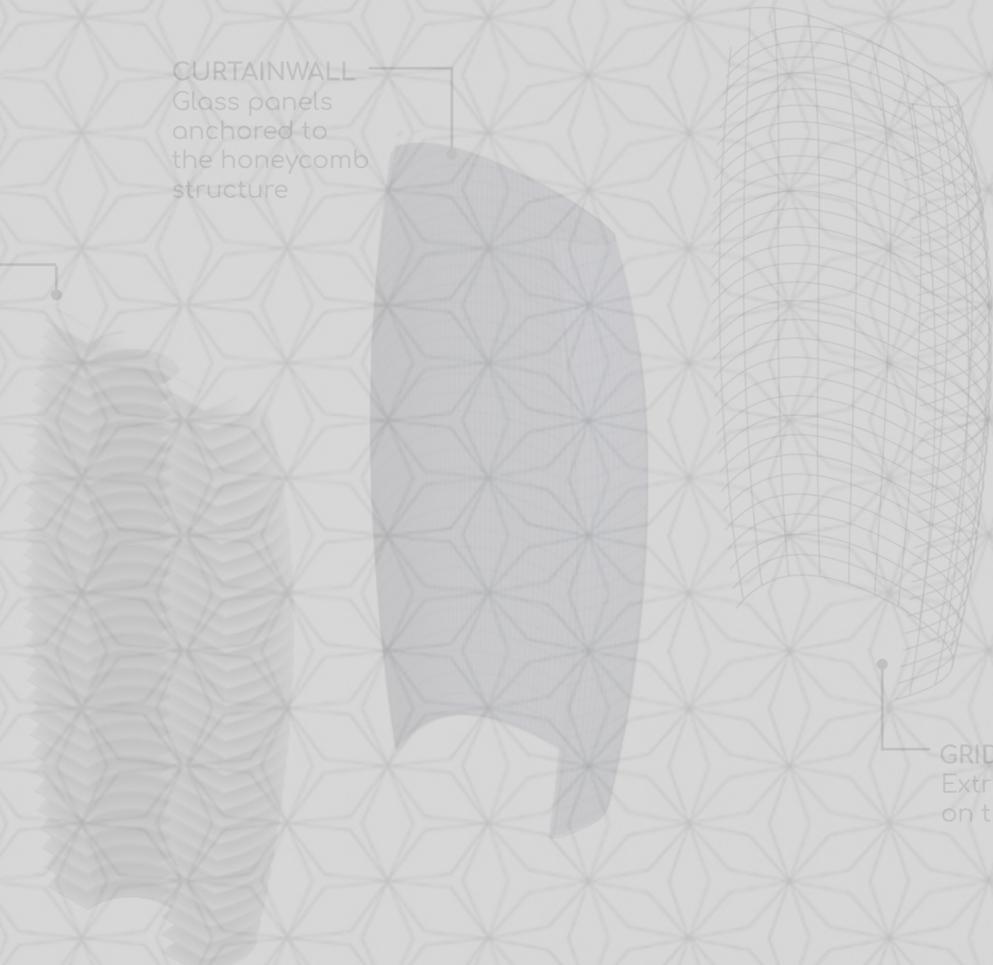
DETAIL SYSTEM ILLUSTRATION



One honeycomb unit sequentially composed between 8 floors with a maximum of 8 glazing unit panels in width.

STRUCTURE
Volume uniformly divided to form floor plates.

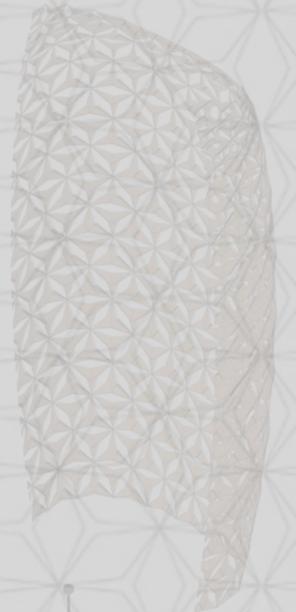
CURTAINWALL
Glass panels anchored to the honeycomb structure



HONEYCOMB
Interlinked nodes generated by the radial grid to generate maximum

GRID
Extruded points on the radial grid.

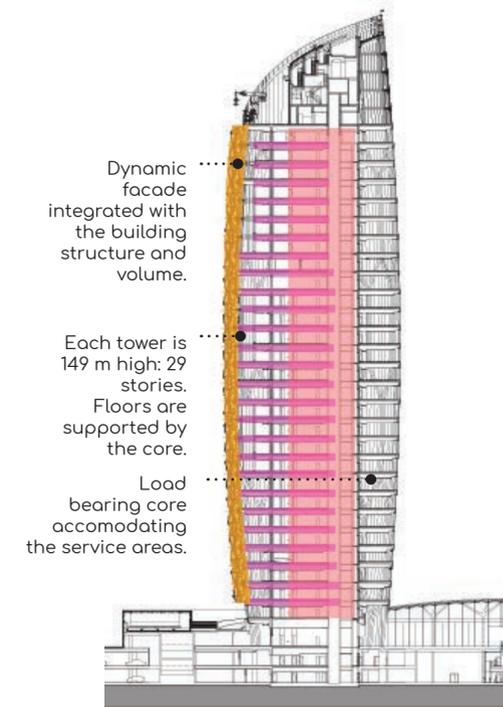
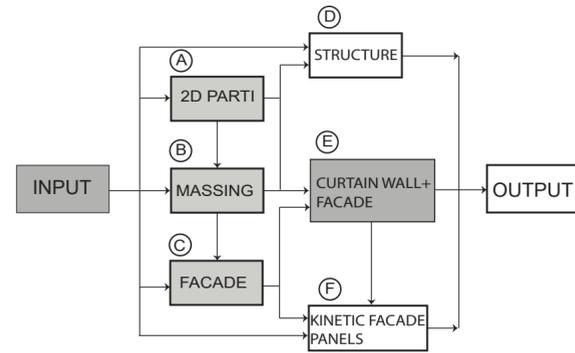
MASHRABIYA
Kinetic triangular panels wrapped on the building surface, which unfold in response to the sun.



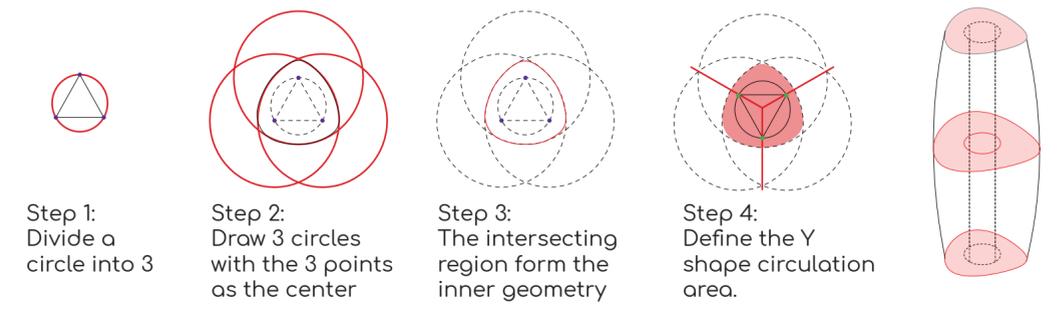
THE TRIANGULAR DYNAMISM | Media and Modeling

abdulrahman alorabi | niloofar nikookar | udiksha nagarak kapini

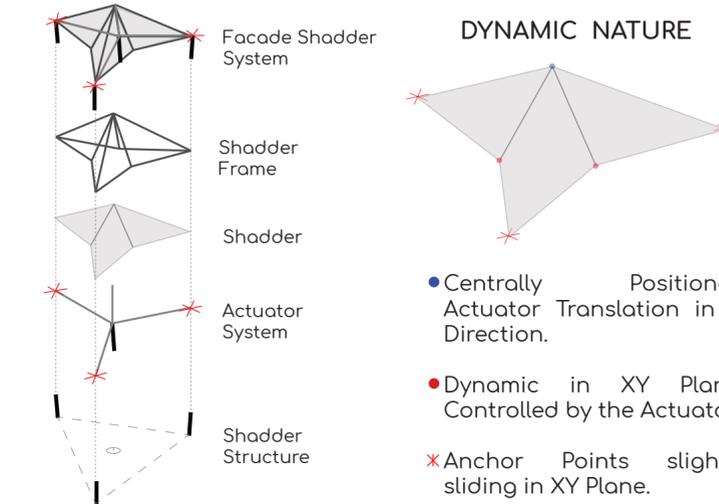
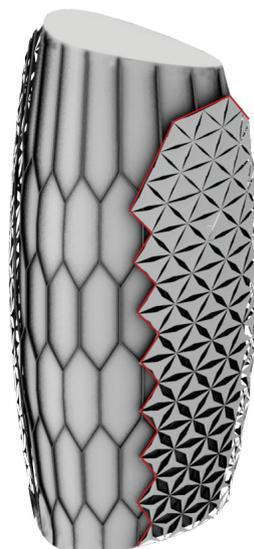
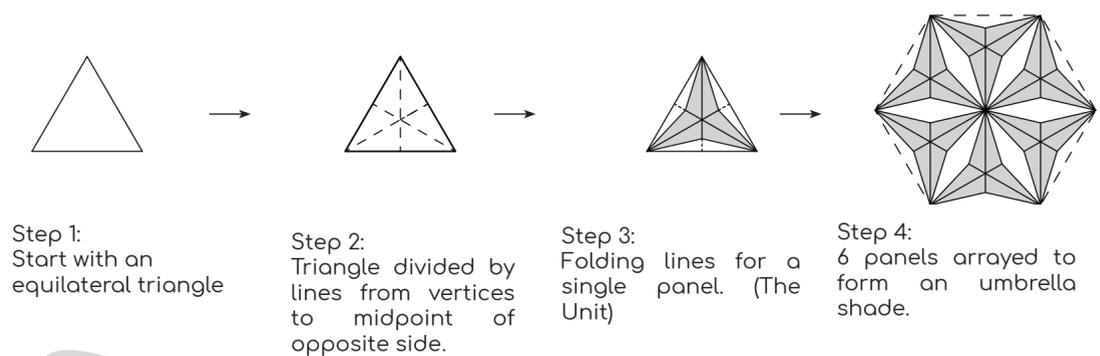
FORMAL ANALYSIS



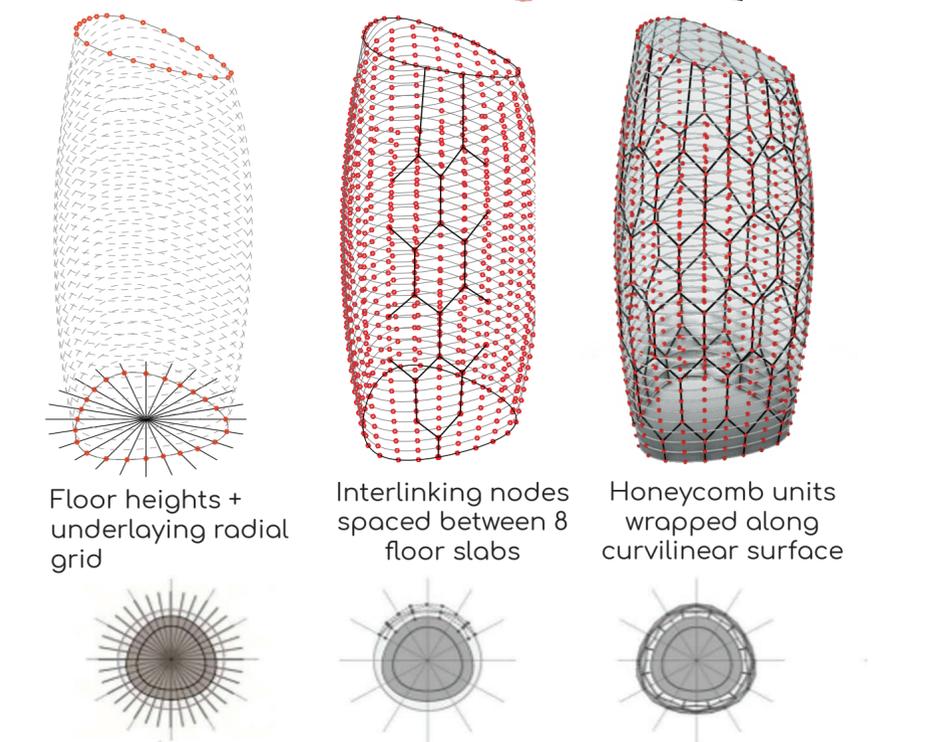
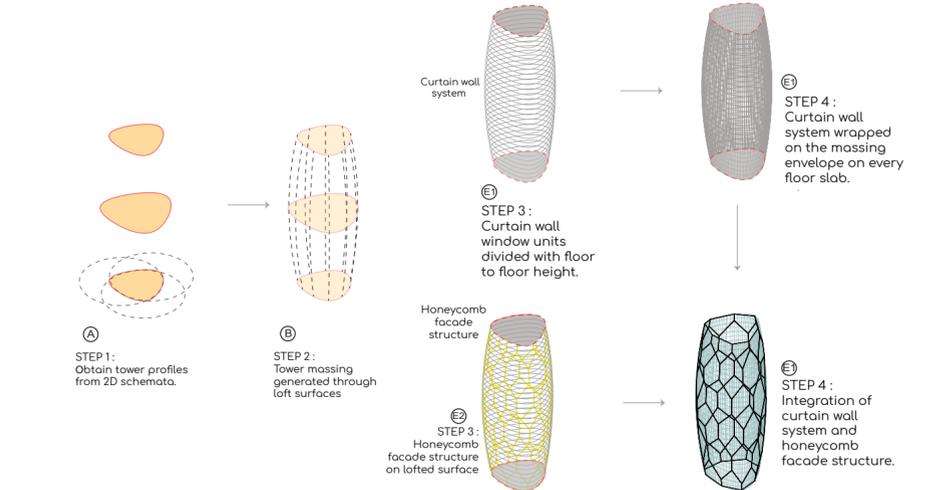
STRUCTURE



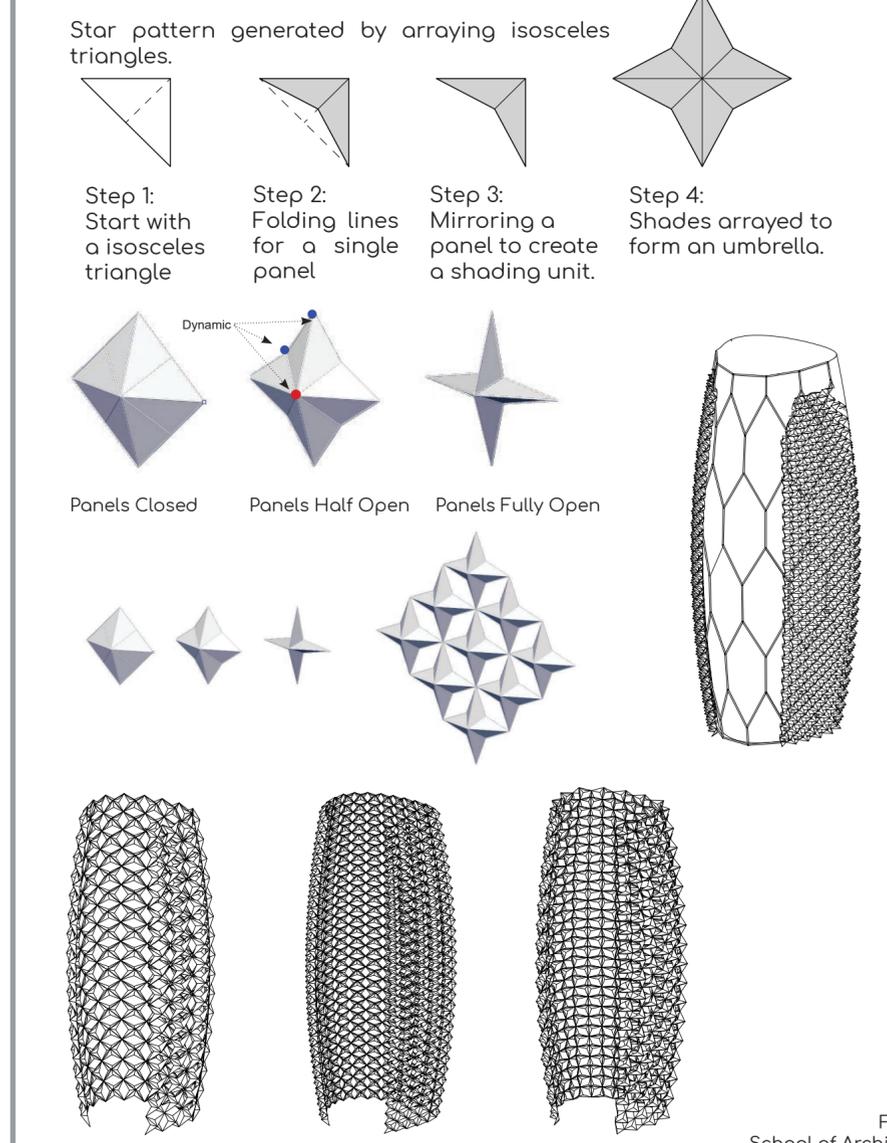
KINETIC FACADE

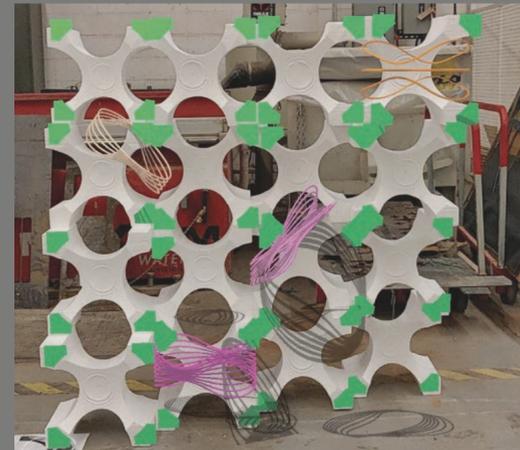
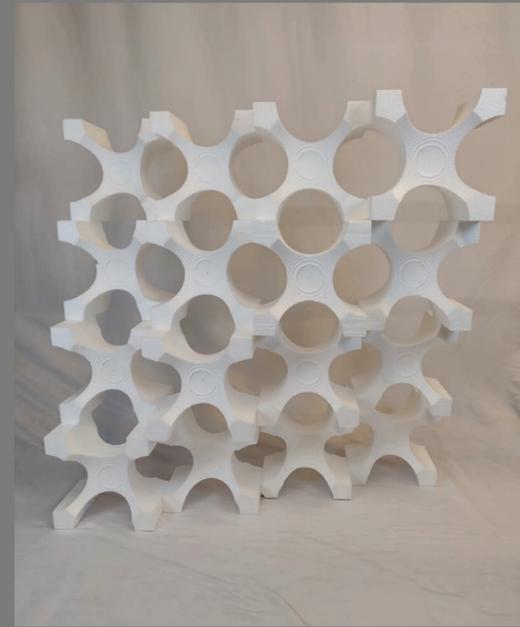


CURTAIN WALL SYSTEM



KINETIC FACADE SYSTEM



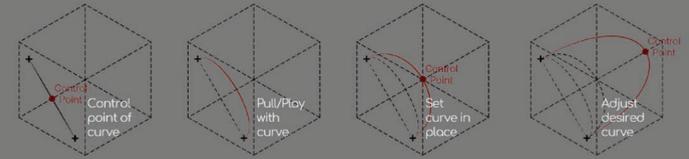


AR integration using Fologram



CNC fabricated material exploration
AR implemented to explore:
- Spatial Analysis
- Geometric systems
- Notational analysis.

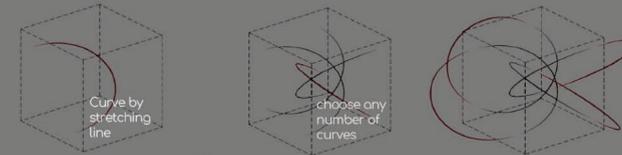
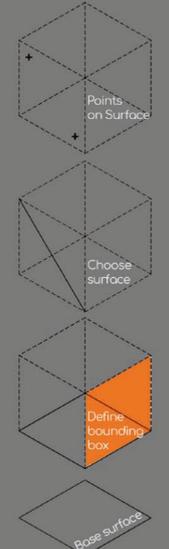
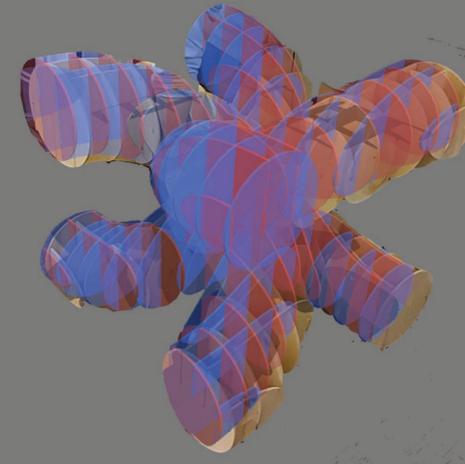
PICK AND PLACE INTERACTIVE PLAY



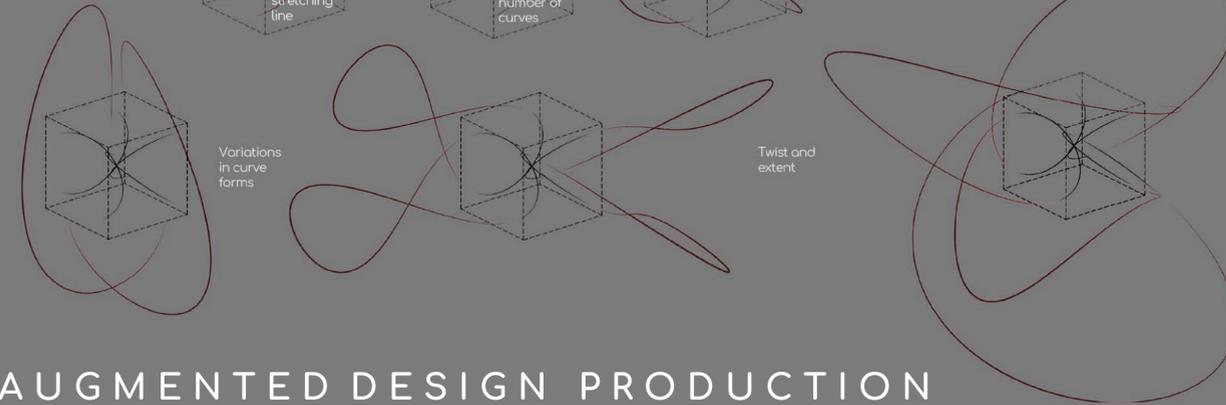
AR driven physical construct



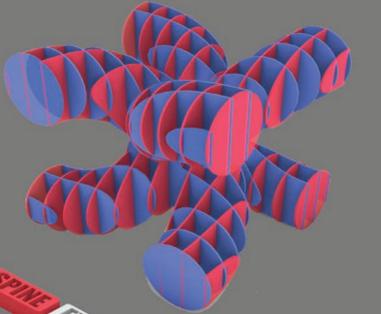
AR Alignment with Physical model



AR functionality



INTEROPERABILITY



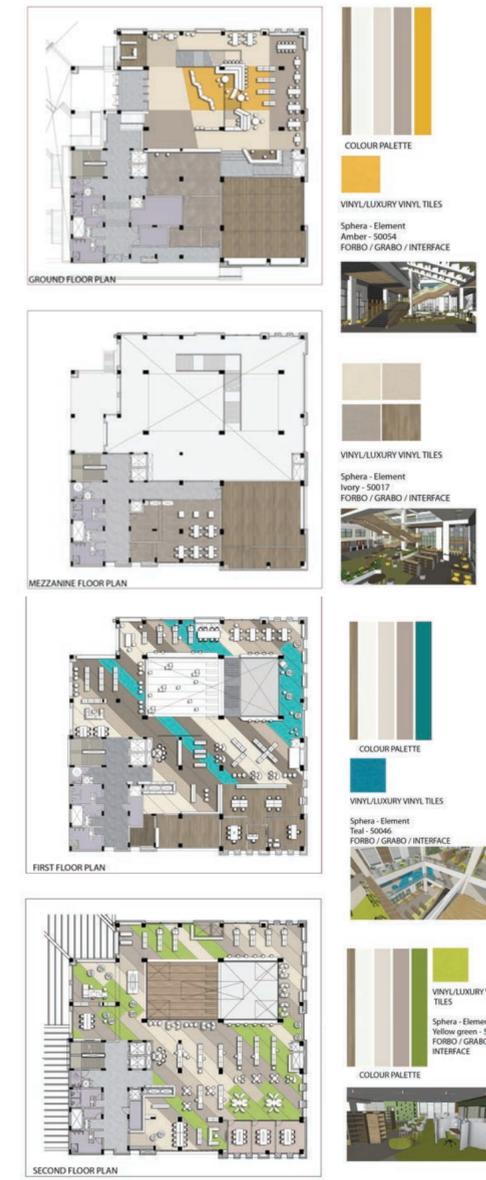
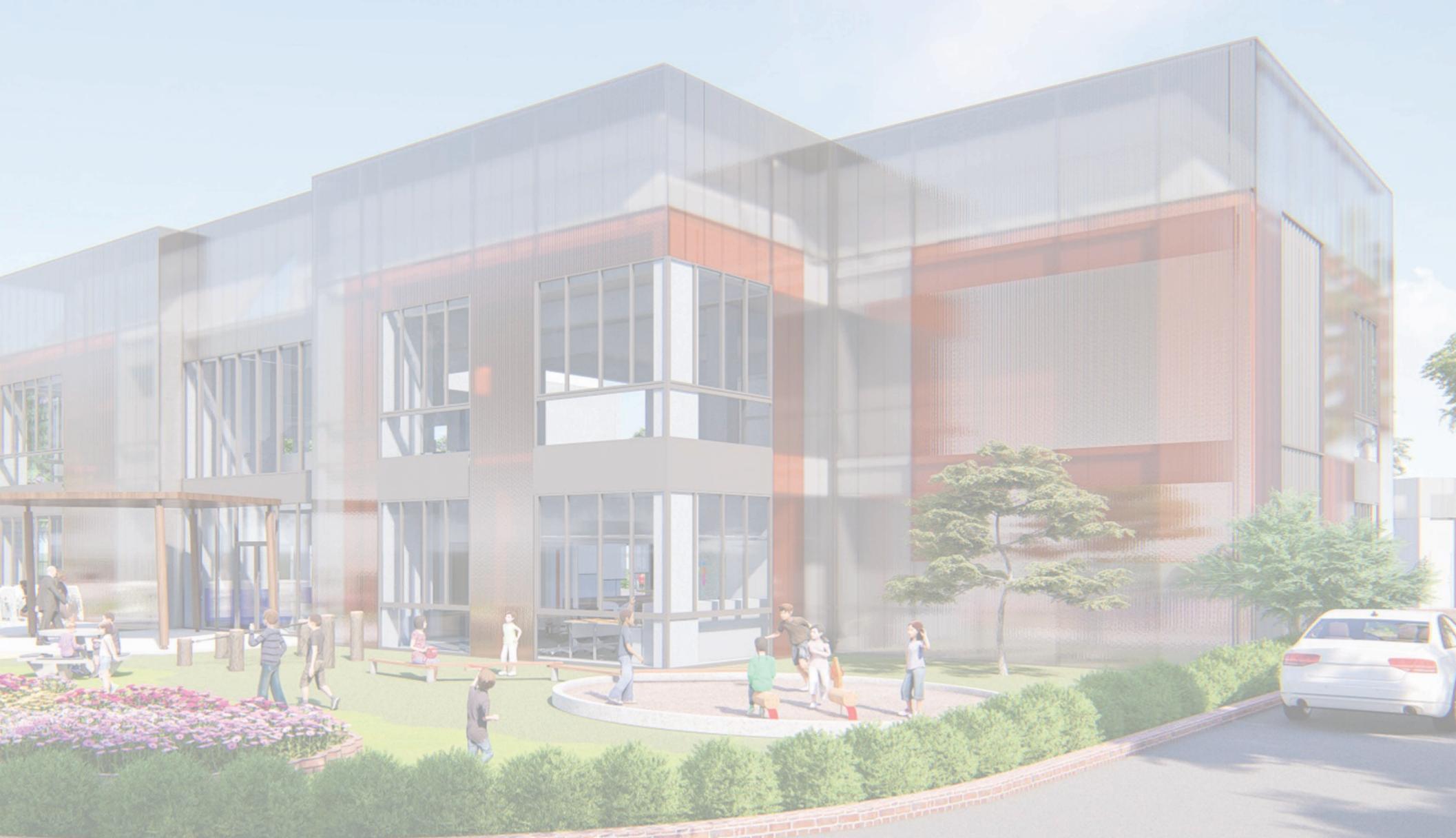
BUTTONS

Fall 2019
School of Architecture
College of Design
Georgia Institute of Technology
ARCH 8833: Advanced Productions

PHYSICAL CONSTRUCT - AR INTEROPERABILITY

sookwang lee | yuhang li | zeyue zhang | udiksha nogarak kapini

AUGMENTED DESIGN PRODUCTION



SCHEMATIC VISUALISATION FOR INTERIORS



1 - NURSERY - WET AND MESSY ZONE



1 - NURSERY - WET AND MESSY ZONE



3 - NURSERY - STORY TELLING ZONE



Heritage Primary School, Gurgaon
 Interior Elevations : finishes and details



INTERNSHIP | Education Design Architects India

Dr. B R Ambedkar School of Economics, Bengaluru
 Library Block
 Flooring Concept & Color palette

LEARNING ZONES

PROMISE Mother and Child
Age: 12 months to 2 years

INSPIRATION

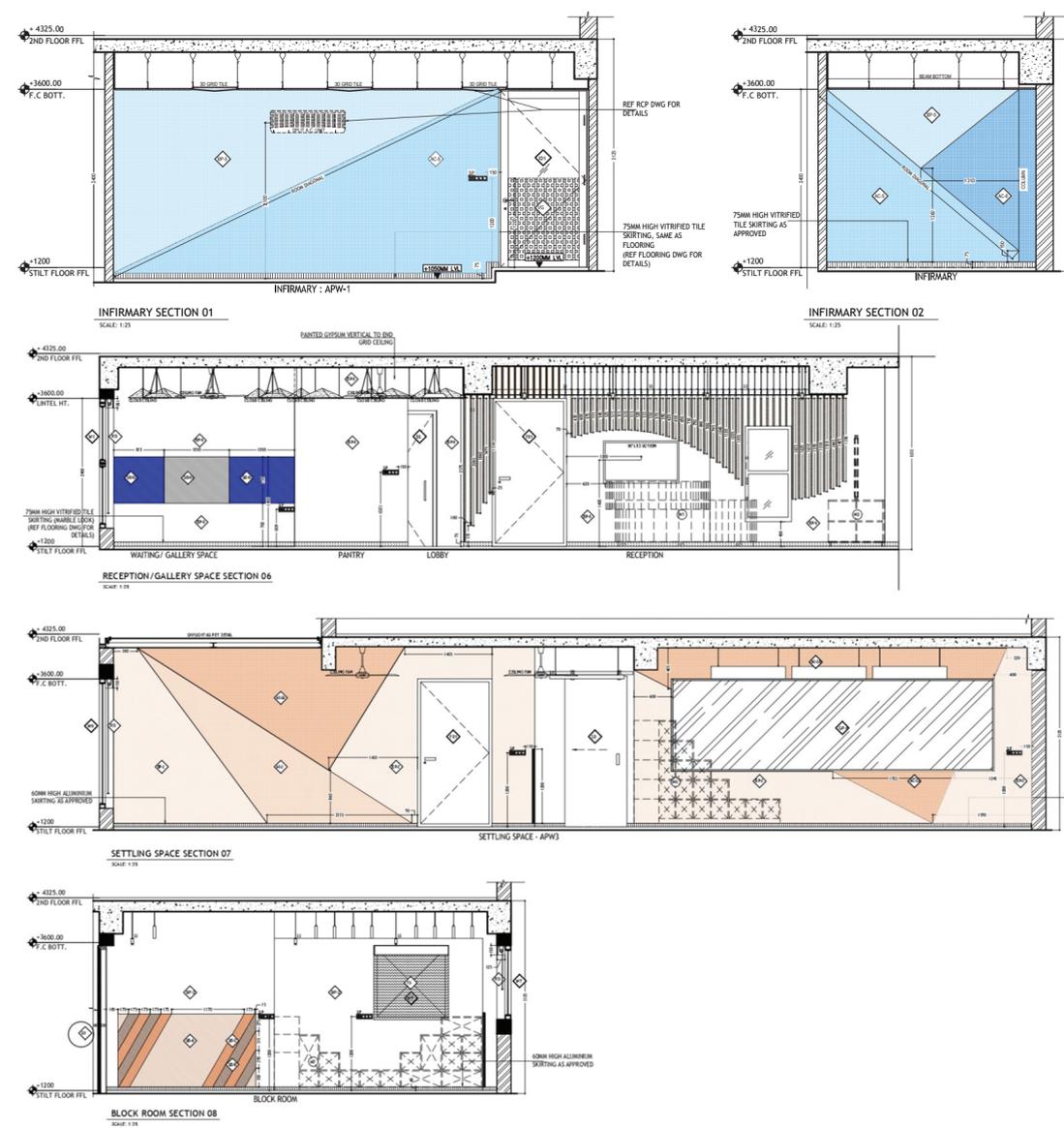
Age: 2 years to 2 years & 6 months

PROGRESS

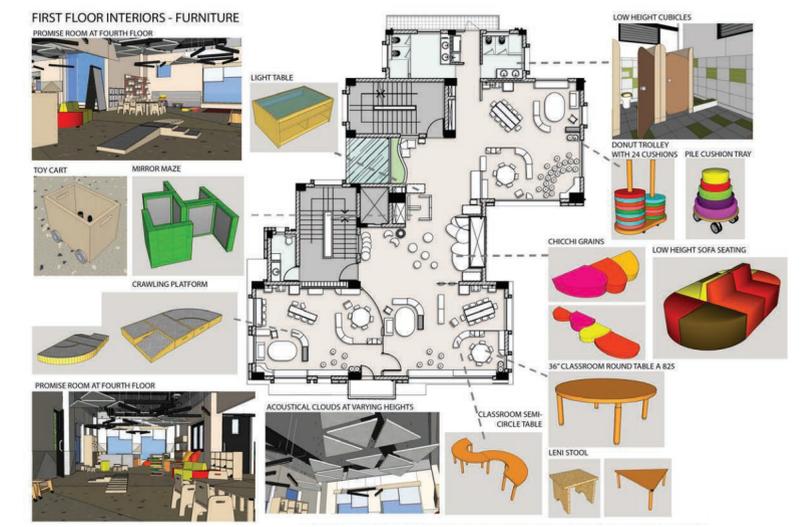
Age: 2 years 6 months to 3 years 6 months



INTERNSHIP | Education Design Architects India



Interior elevation:
Wall finishes, Cladding



Interior Furniture for toddlers
Color palette
Material suitability
Storage and stacking



Spring 2019
CCBA Designs Pvt. Ltd, India
Bachelor of Architecture
RV College of Architecture
Professional Training II: Internship



GROUND FLOOR PLAN



VIEW OF NORTH EAST FACE



BIRD'S EYE VIEW OF PROPOSED SSD.



VIEW OF EAST FACE



VIEW OF SOUTH WEST FACE

STEAM SYSTEMS DIVISION

A Permanent structure in R.C.C., P.T. & steel.

Availing more usable space with a G+1 structure

Future manufacturing area proposed.

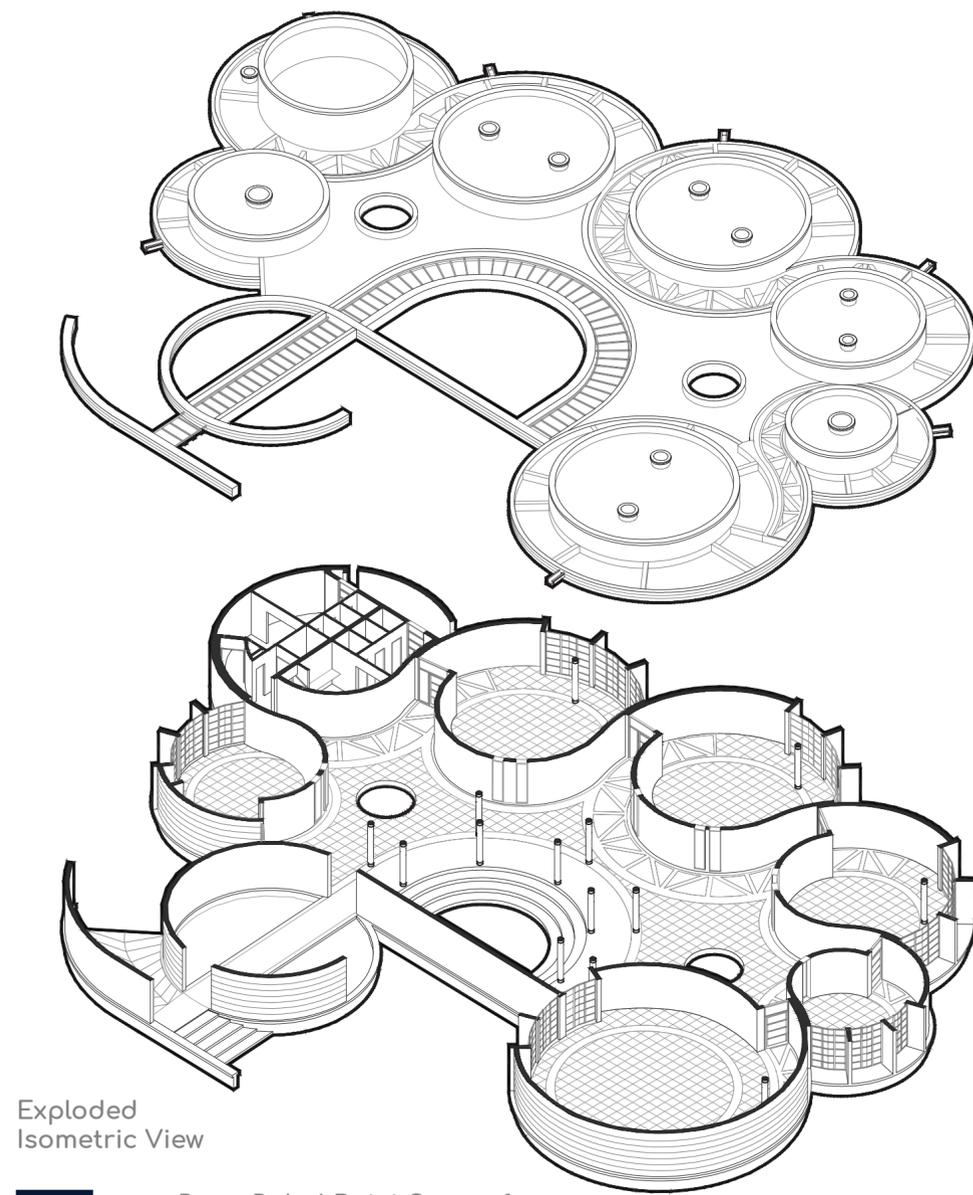
The structure proposed will cover less ground area as a G+1 unit.

The SSD proposal is in line with the proposed masterplan and envision of the board

The main utilities for the proposal have been catered to in the initial design.



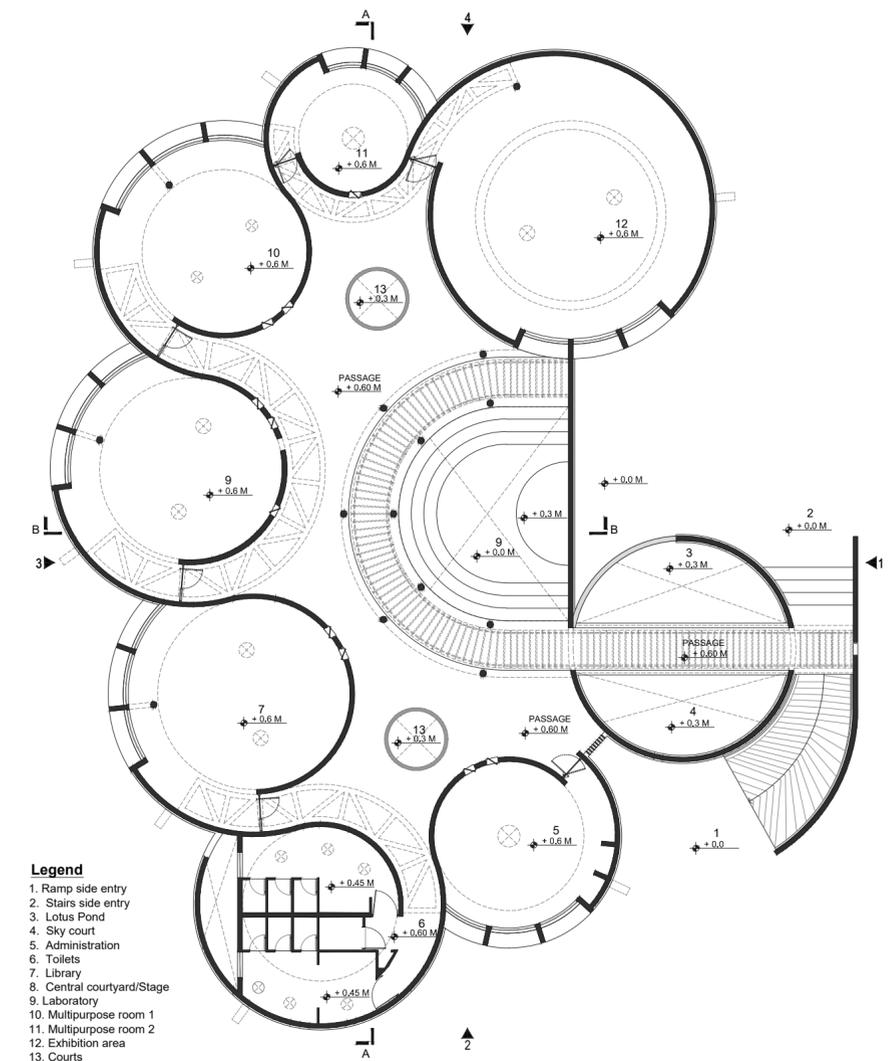
INTERNSHIP | CCBA Design pvt ltd



Exploded Isometric View



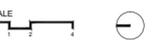
Rupa Rahul Bojaj Center for Environment and Arts, Empress Garden, Pune

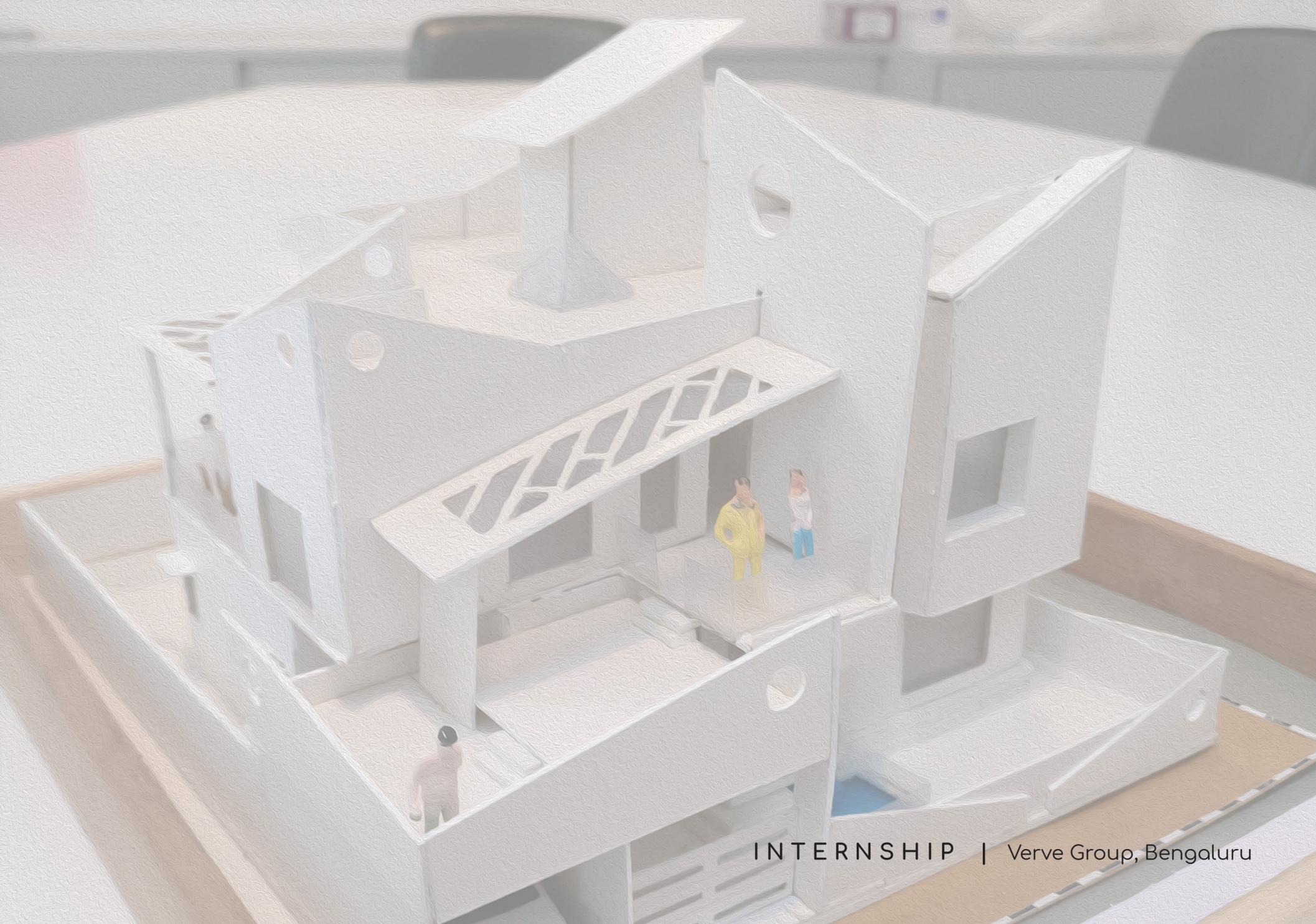


Legend

- 1. Ramp side entry
- 2. Stairs side entry
- 3. Lotus Pond
- 4. Sky court
- 5. Administration
- 6. Toilets
- 7. Library
- 8. Central courtyard/Stage
- 9. Laboratory
- 10. Multipurpose room 1
- 11. Multipurpose room 2
- 12. Exhibition area
- 13. Courts

Ground Floor Plan





INTERNSHIP | Verve Group, Bengaluru



Roca Showroom Interiors : Planning, finishes and Details



High school Design : Site Planning
Space programming, landscaping.

VERVE
Architects Planners
Engineers Pvt Ltd
Summer 2016,2017
Verve Group, India
Bachelor of Architecture
RV College of Architecture
Internship

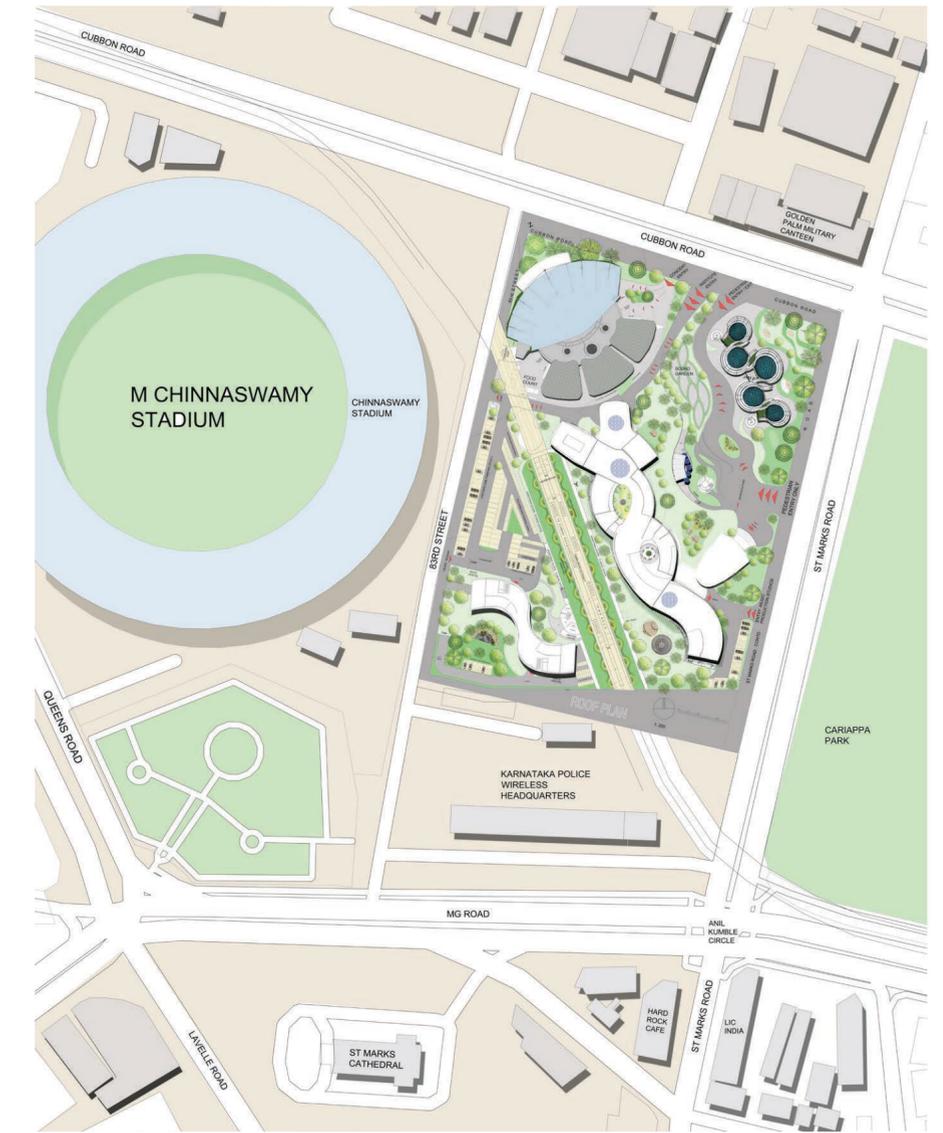
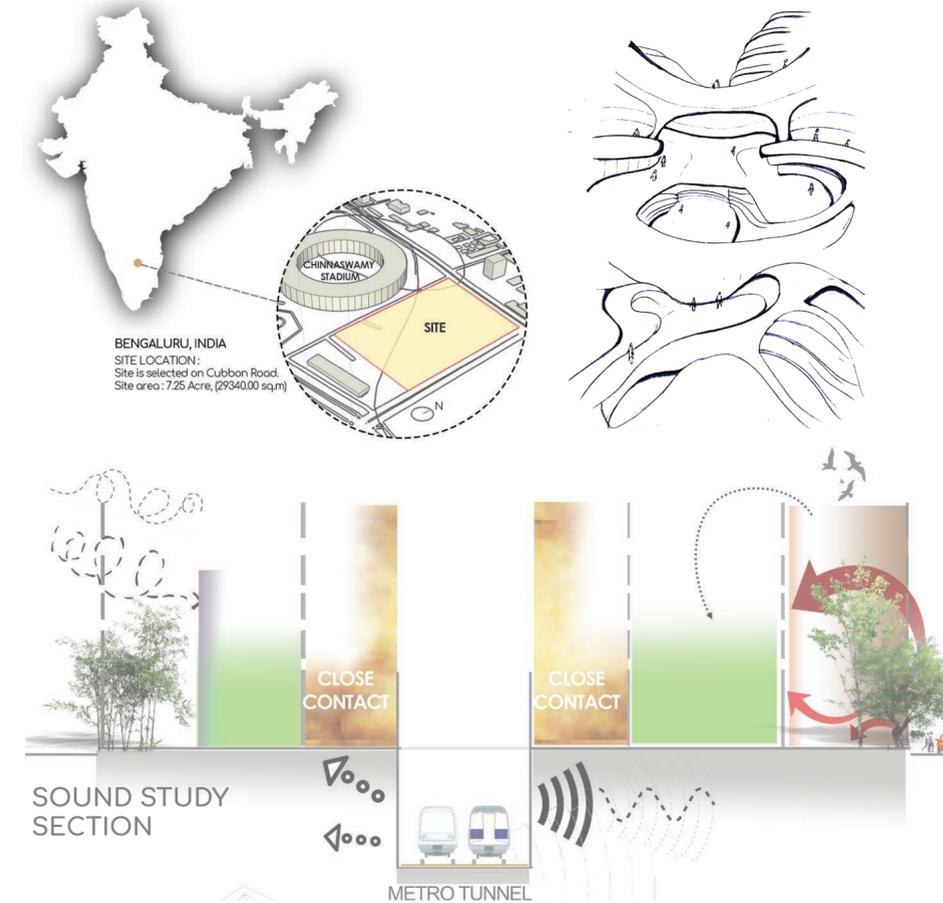


SYMPHONY OF AURAL SPACES | B.Arch Thesis

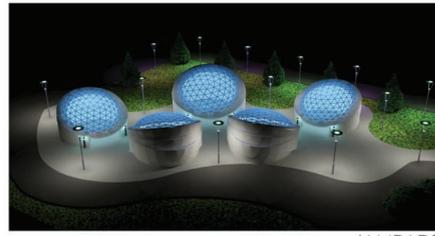
INSTITUTE FOR CONTEMPORARY MUSIC & CONCERT ARENA

A need for comprehensive contemporary music education in India to provide students a multi-cultural musical vocabulary to prepare them for broad spectrum of 21st century music

This Thesis aims to explore the possibilities of spaces being perceived through the effect of Aural Experience and to thereby develop an arena with inter-connected scholastic spaces for International Music culture.



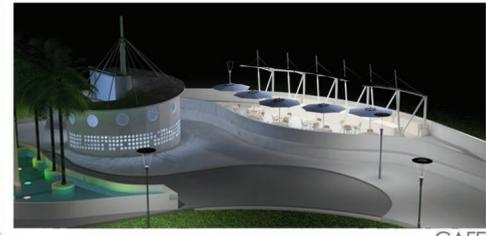
SITE PLAN



JAMPADS



INSTITUTE



CAFE



WATER SCULPTURE

- 1. ACADEMIC BLOCK
- 2. JAMPADS
- 3. CONCERT ARENA
- 4. CAFE
- 5. HOSTEL
- 6. SITE ENTRANCE
- 7. METRO RAIL TRACK
- 8. RECORDING STUDIOS



SYMPHONY OF AURAL SPACES | BArch Thesis



GROUND FLOOR PLAN



WEST ELEVATION



NORTH ELEVATION
Cubbon Road side

Intent of Design

The city of Bangalore, a hub for concerts and music events lacks dedicated spaces to support the requirements for this sector.



OPEN COURT

Palace grounds in the city was the only venue that was catering to the demands for these shows, where temporary infrastructure could be erected to conduct these concerts

Cross-cultural music dialogue and exchange between contemporary forms of music.



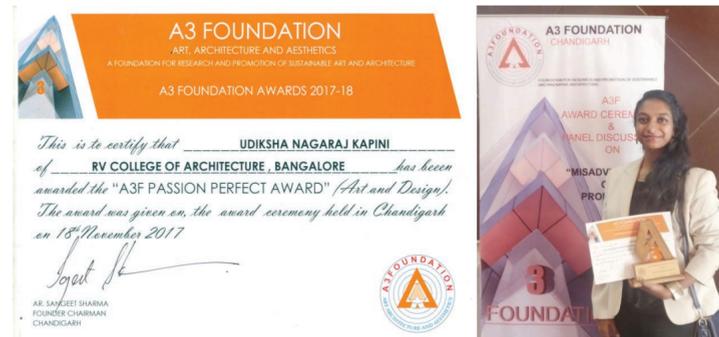
ENTRANCE

To unite music and architecture in such a way that the design influences and inspires creativity and encourages an exploration of sound and music by the students and performers.

AWARDS AND RECOGNITION

2017

2018



A promising 5th year student of Architecture from RV College of Architecture, Bangalore and presently completing my internship at Christopher Charles Benninger Architects, Pune, (CCBA Designs Pvt. Ltd), passionate about Architecture and Art. I believe that Architecture is the only tangible form of art and I consider myself, a motivated and determined individual ready to take on challenges and make a difference through my designs towards this form of art. My inclination towards art began at a young age of 6 when I had my first exhibition of my artwork along with my sister, Rutusha Nagaraj who is also a WADE Awardee 2017. The proceedings of the exhibition went towards charity. Growing up we took part in a lot of art competitions and have many achievements in our credit. From then on the strong positive influence of Architecture that I was surrounded by, instigated by my parents both being Architects, Nagaraj Kapini & Pranoti Nagaraj inspired me towards this creative field.

UDIKSHA NAGARAJ KAPINI
 MS ARCHITECTURE CANDIDATE 2021
 udiksha@gmail.com
 ukapini3@gatech.edu