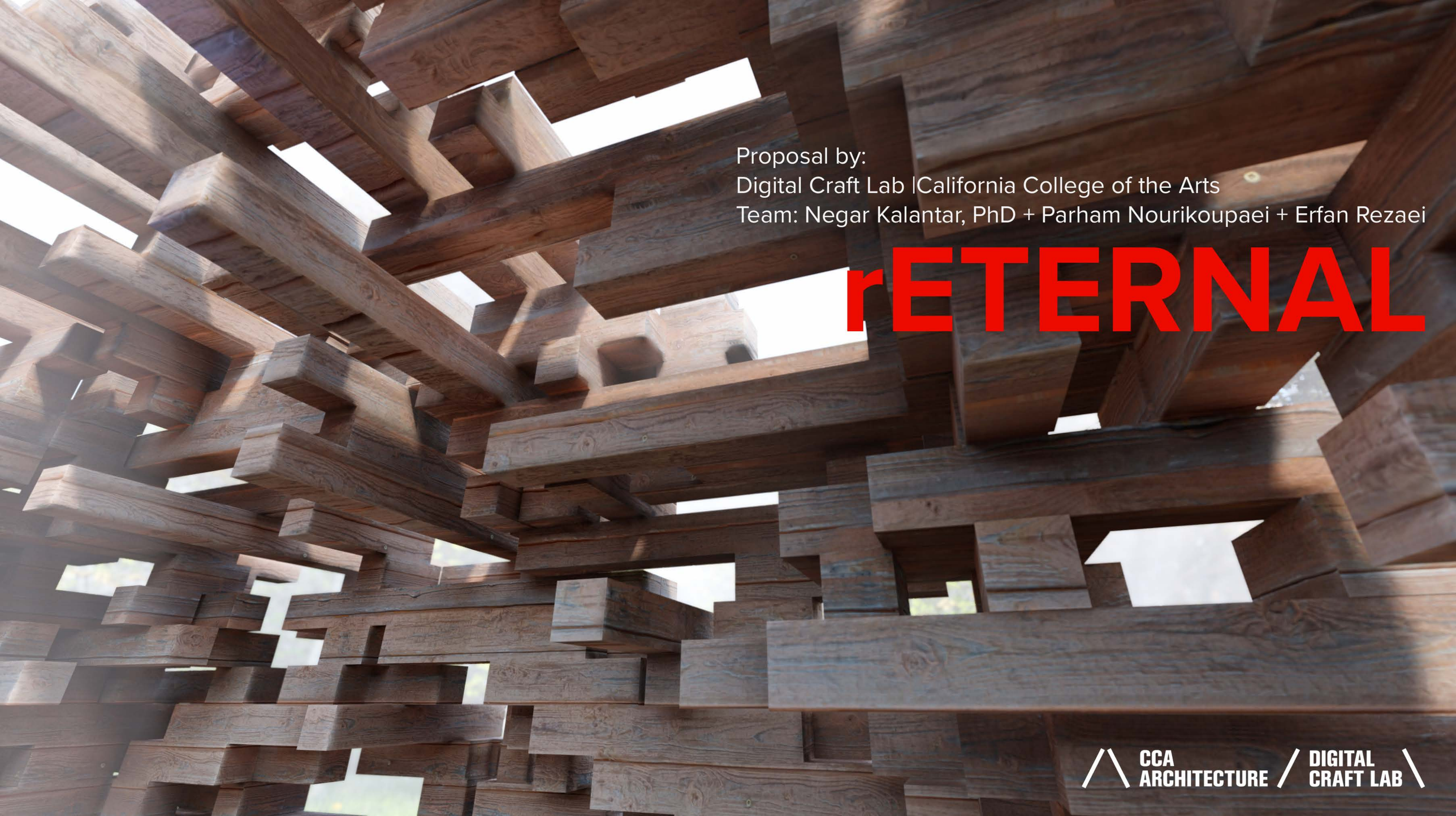
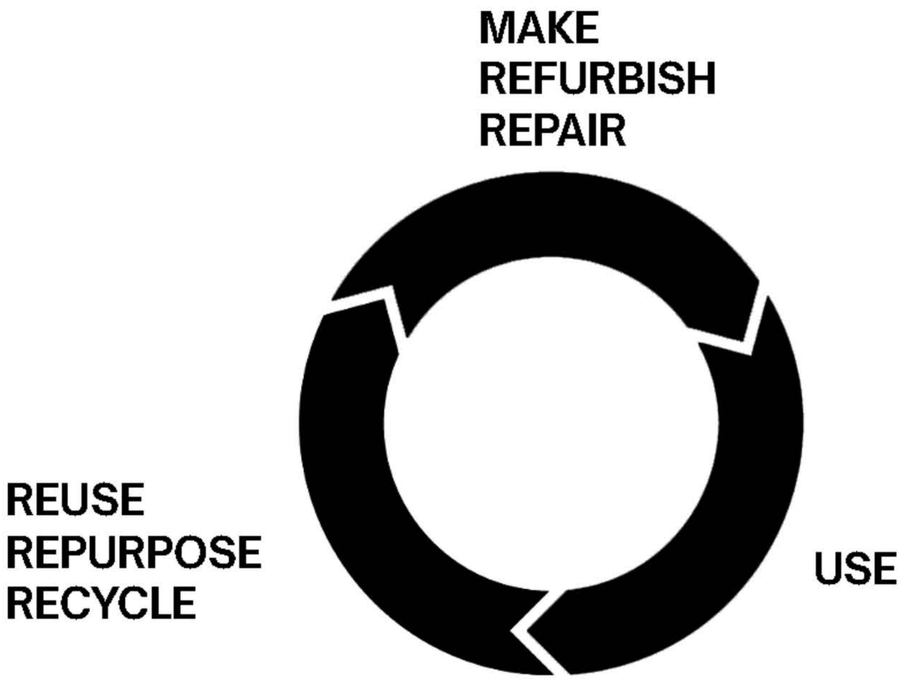


Proposal by:
Digital Craft Lab |California College of the Arts
Team: Negar Kalantar, PhD + Parham Nourikoupaei + Erfan Rezaei

rETERNAL

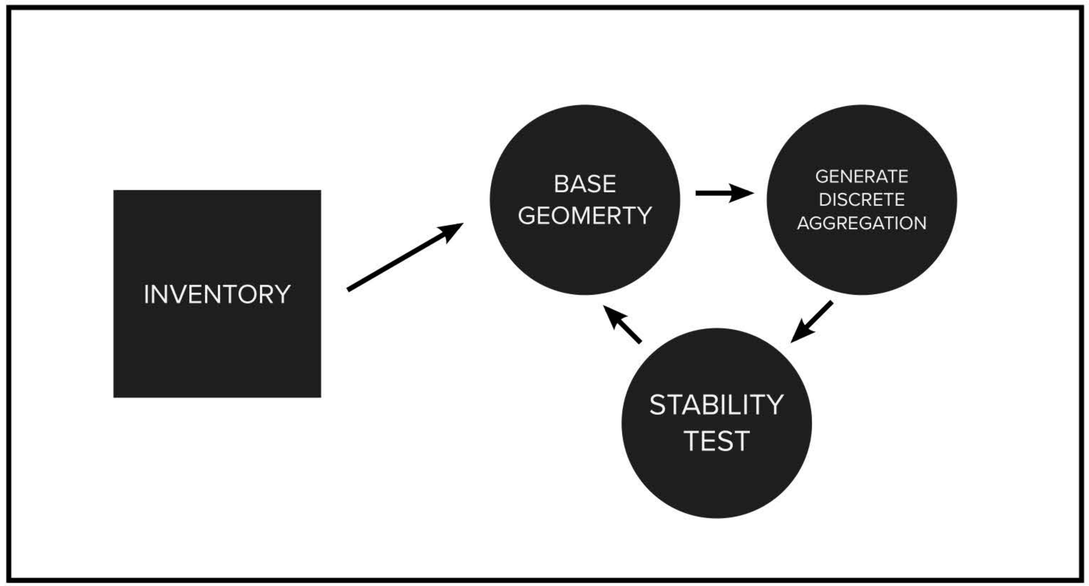
CCA ARCHITECTURE / DIGITAL CRAFT LAB

LINEAR ECONOMY

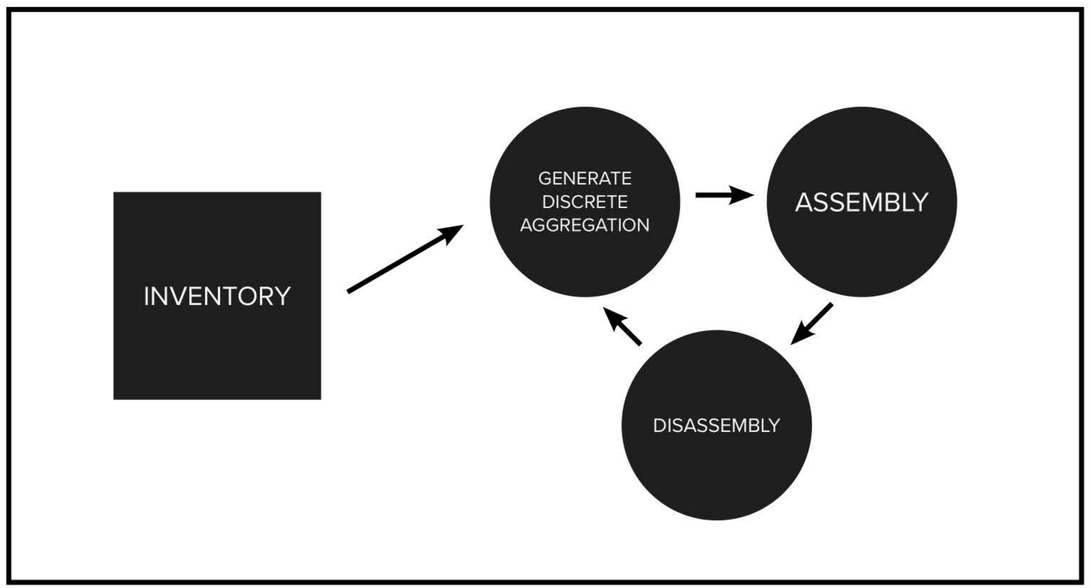


CIRCULAR ECONOMY

CIRCULARITY IN DESIGN



CIRCULARITY IN FABRICATION



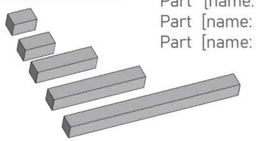
Inputs

Surface

The input surface can be used to generate the field constrain

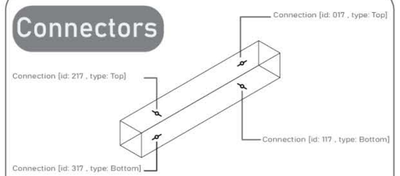
Parts

Part [name: 0, id: 48']
Part [name: 1, id: 26']
Part [name: 2, id: 17']
Part [name: 3, id: 8.5']
Part [name: 4, id: 6.5']



Parts are the wood blocks containing the geometrical properties and limit of usage

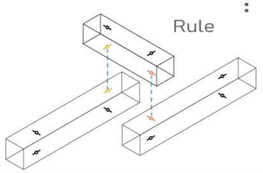
Connectors



Connectors are the pins which can demen-strate the position and orientation of

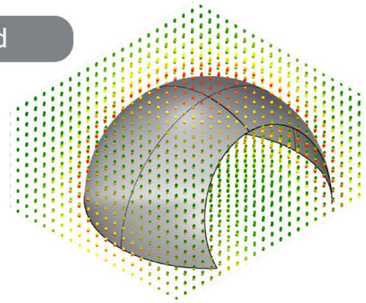
Ruls

Rule [0|0_1|0]
Rule [0|0_1|1]
Rule [0|0_1|2]
Rule [0|0_1|3]
⋮
Rule [4|3_3|3]



Constraints

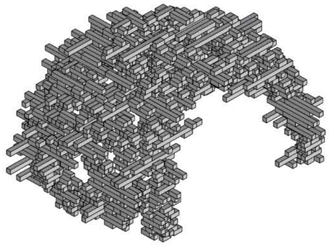
Field



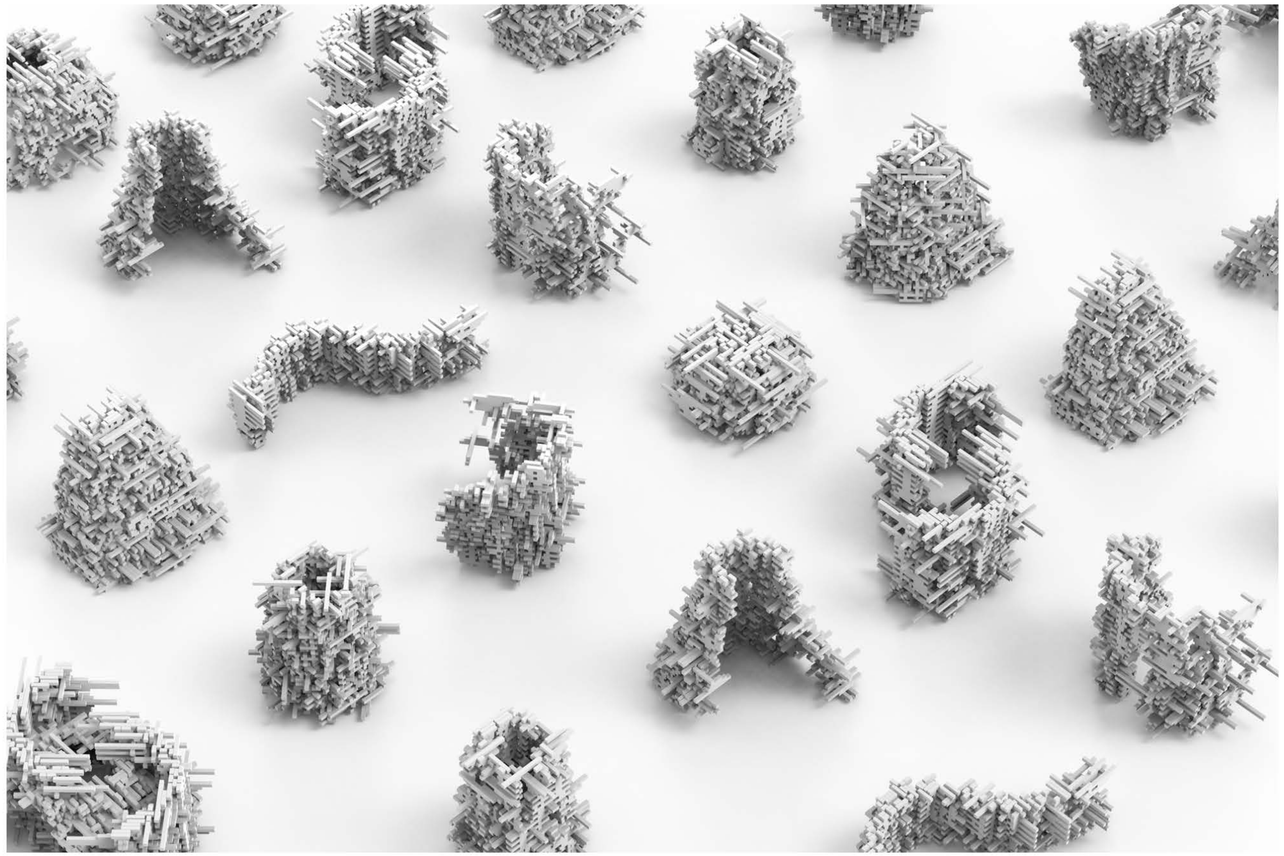
Stability

Grasshopper WASP

Output

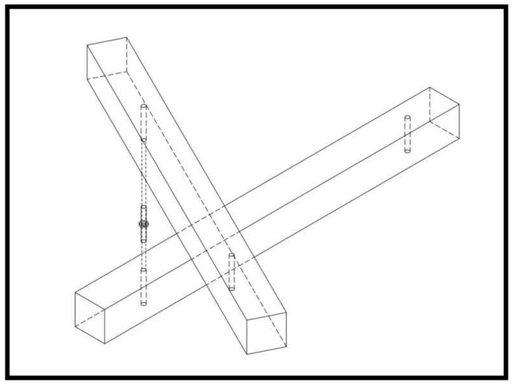


more outputs with different base geometries:



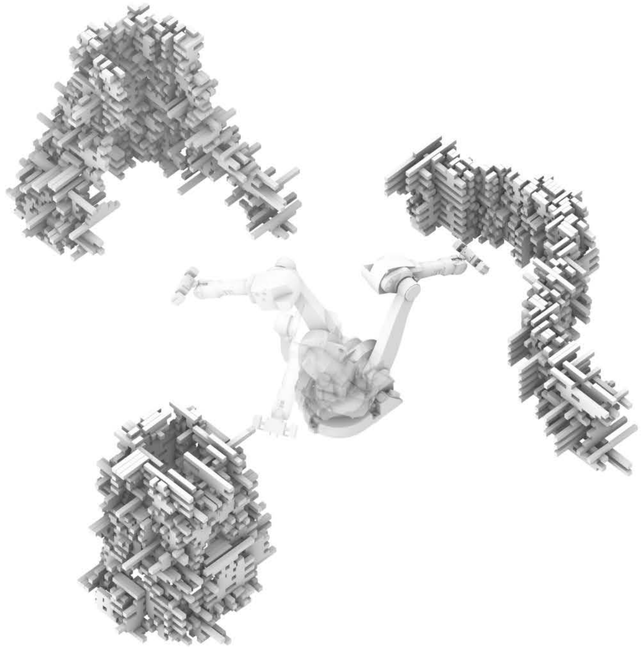
Base Geometry

Lateral Force Resisting (Stainless Steel Pin)
+ The only modification is drilling two small holes on each part.

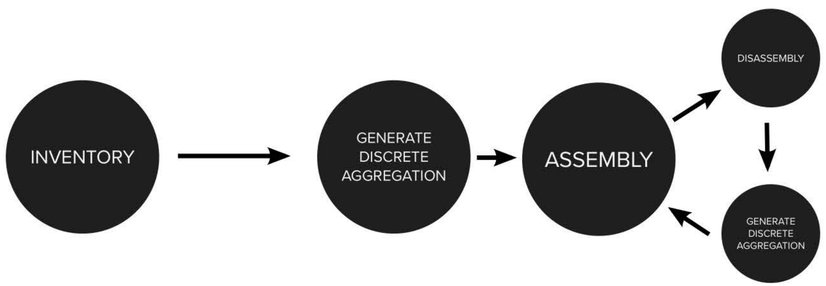


Generate Aggregation

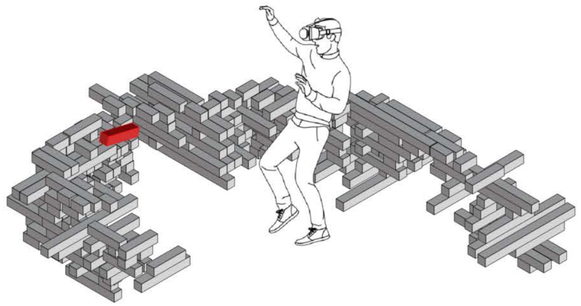
IDEA 1



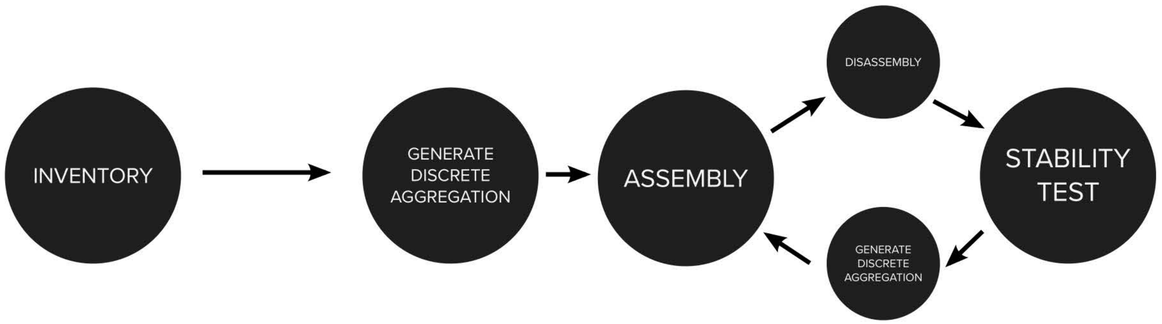
CONTINUOUS ROBOTIC FABRICATION
TOOLS: ROBOT ARM + TRACK



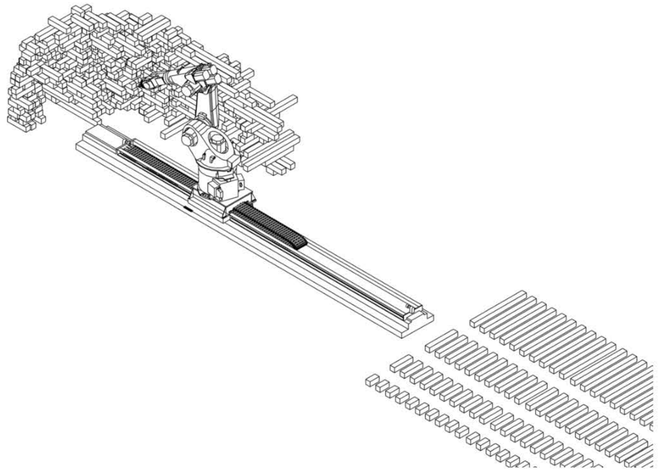
IDEA 2



MANUAL ASSEMBLY + REAL-TIME STABILITY TESTING
TOOLS:
MICROSOFT HOLOLENS 2 + UNITY (MRTK)



IDEA 3



ROBOTIC ASSEMBLY
TOOLS:
ABB IRB 4600 (Payload: 20kg and Reach: 2.5m)
ABB IRBT 2005 - Medium Track Motion Platform

Heaviest Part 15 lbs & Farthest Part 2.5 m → Payload >7 kg | Reach >2.5 →

&

We propose to make it in CCA/Digital Craft Lab (San Francisco).

CCA ARCHITECTURE / DIGITAL CRAFT LAB x EVENTSCAPE

Potential Collaborator:

AUTODESK
Technology Center
(Pier 9) San Francisco

AUTODESK
Technology Center
Boston

1. Utilization of the stock
   - Does the project utilize the stocks close to its original state, or does it require significant modifications to the stock?

-The only modification is drilling two small holes on each part.

2. Consideration of secondary impacts
   - Can the structure have a second life? Can it be disassembled, reassembled into different configurations?
   - Will it require secondary procedures- 3D printed, machined joints, off-the-shelf products? If so, is the impact of these secondary procedures considered in the proposal?
   - Are the machine times and the resulting energy consumption considered?

-Sure!
-No! The only possible option is Stainless Steel Pin for lateral force resisting.
-Yes!

3. Involvement of Technology
   - How does technology affect and improve the workflow of design and fabrication?
   - Level of involvement of technology (including but not limited to computational design, structural optimization, mixed reality, digital/robotic fabrication, AI assisted workflows) within the various phases of the project. For example, does the strategy require human-robot collaboration in the production and/or installation phase? Or can it utilize mixed reality and/or laser projection in the production and installation phase?

-Using Grasshopper+WASP to make a design solution for discrete aggregations.
-We have 3 ideas for fabrication with using robot arm and Hololens 2. We also use Unity (MRTK) for real-time atability monitoring in fabrication process.

4. Compelling narrative
   - Does the project have a narrative, and a function that goes beyond structural and material optimization?
   - Does it have a compelling visual language?

-Yes. We focus on circular economy and reusing material without any change and generate millions of iterations by changing the base geometry.

5. Fabrication Strategy & Level of Support
   - How will the project be made? What facilities will be used to fabricate the project?
   - Does the academic research group have the in-house capabilities to execute the project, or will they require Eventscape's support? If so, what level of support will they require?

-We are able to make it in Digital Craft Lab at CCA in collaboration with Eventscape.
The other option is collaborating with Autodesk in San Francisco or Boston Technology Centers.