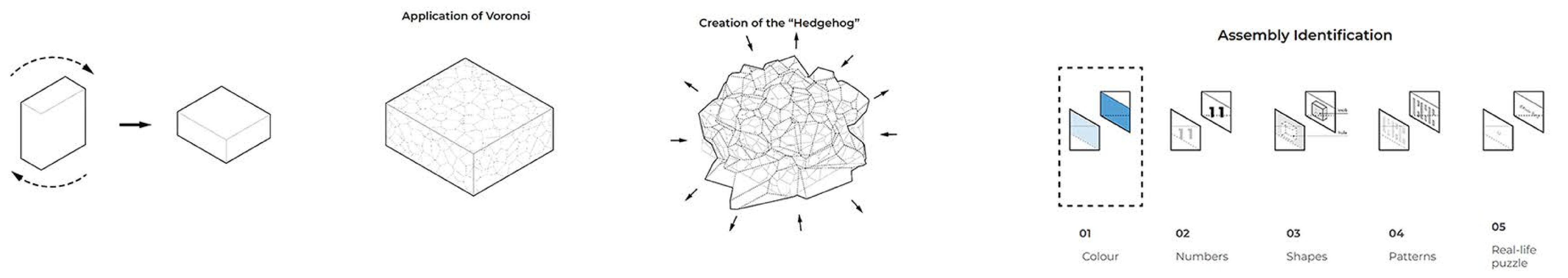
THE PLAYSCAPE
Interactive Furniture Design

Our vision for the interactive design was a development of outdoor and indoor furniture. The design combined within itself 5 most important features - interactivity, so the users can create their own form form modules; biodiversity - cells that would work with environment and purify the air; education - a space to work, explore, play and socialise and safety - so the furniture would be good to use for younger and older users. Following the thought of “playground for students” we developed the concept of the wall, that can be assembled in different ways and create new forms for social interactions. During the design process we wanted to include mentioned values, therefore different types of cells were created with the usage of different types of material - from rubber, to PLY and wood.

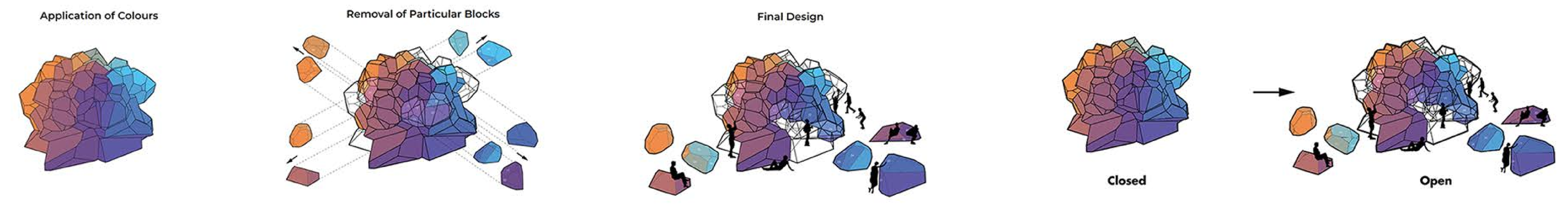
1. CONCEPT

We started the process of computational design with the generation of a point cloud, from which a 3D voronoi pattern could be generated. When translating our findings into 3D we subtrack certain cells in order to create adjustable system which can be assemble and disasamble by its users.



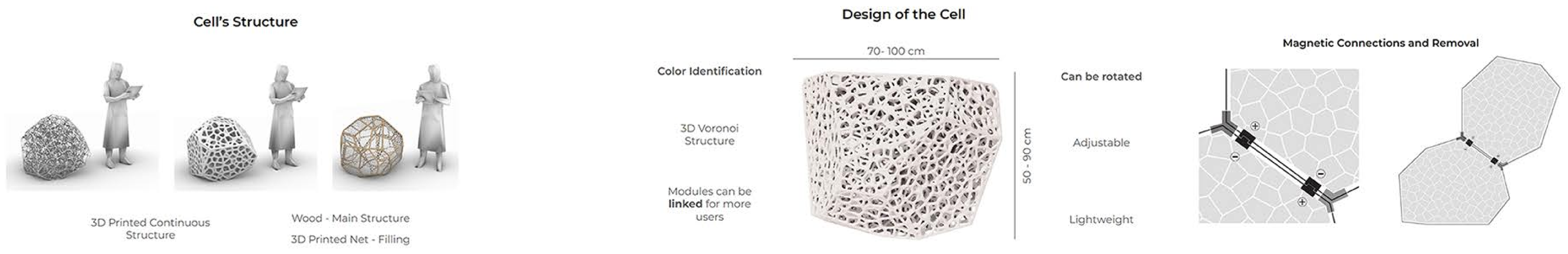
2. FINAL DESIGN

The units have the colour-coding system so the users could easily assemble and disassemble the cells, following their needs and the site requirements.



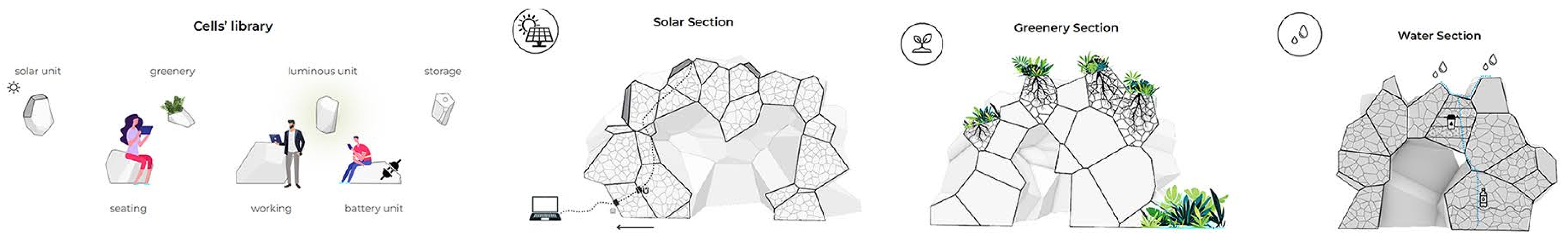
3. CELL'S STRUCTURE

The load bearing, fixed structure is composed of wooden beams. The elements that infill it are the 3D printed cells that can be freely disassembled to create versatile, adjustable furniture.



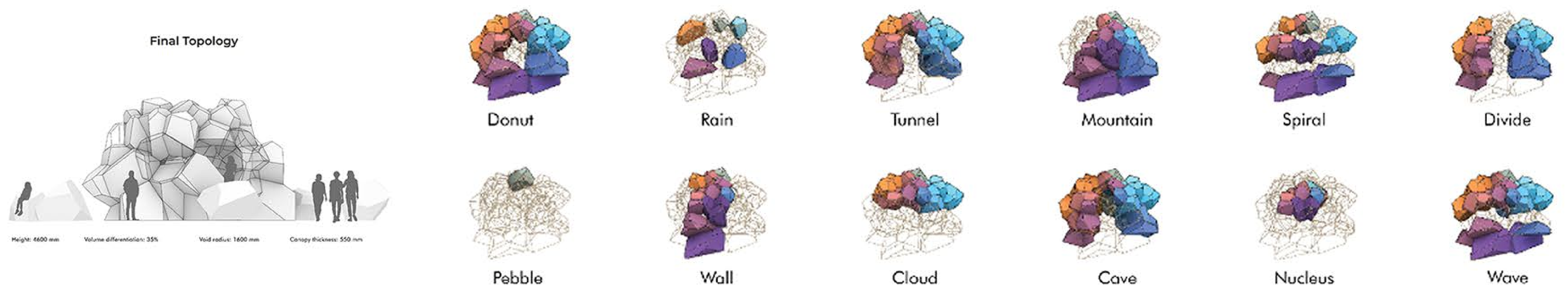
4. CELL'S LIBRARY

Thanks to their porosity, they can suit different functions: as a solar unit, greenery, luminous, storage, seat, working place, water filtering or a battery charger.



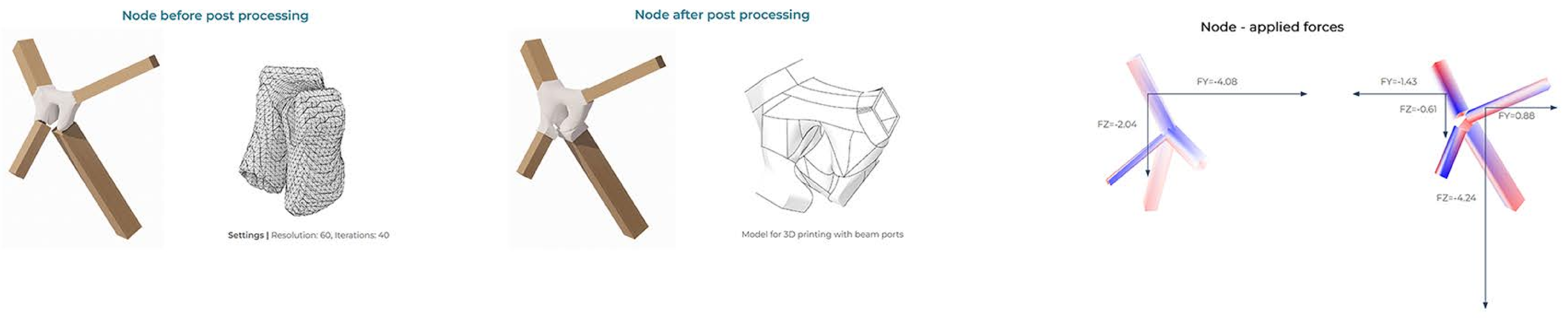
5. TOPOLOGY

The adjustability is therefore not only connected to the activitiesbut also to the pre-conditions - the structure can be used in versatile surroundings - in the park, as an urban furniture, on the public square, as an interior furniture. The design potential is almost infinite.



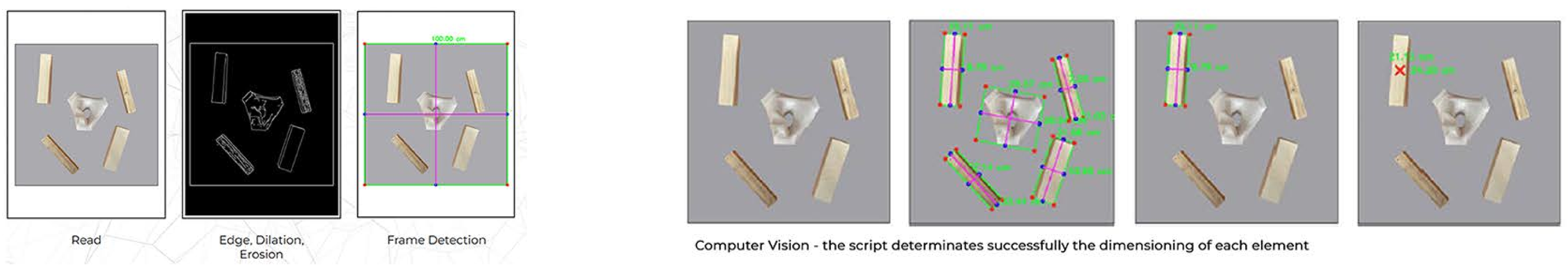
6. NODE OPTIMIZATION

During the structural optimization in Grasshopper, we used the Karamba plug-in. The programme calculated the most optimised section for all the beams. Next, we chose two nodes for further investigation. Than, we worked on the post-processing with 3D modelling in Rhinoceros to achieve a material efficient and aesthetically satisfactory form of the node as a closed polysurfaces. At the end we added the beam ports and optimised the model for 3D printing.



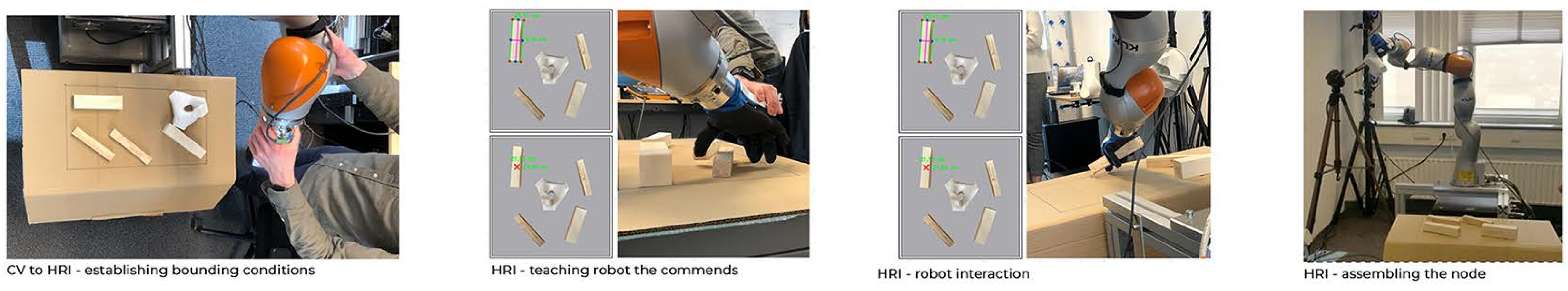
7. COMPUTER VISION

The Computer Vision segment of this research focused on the usage of the dissected node on a 2D planar surface, in order to create an accurate digital visual for the robotic arm to process and take action.



8. HUMAN TO ROBOT INTERACTION

Computer's visual provisions played a crucial role here, and allowed the robotic arm to detect the pieces of our node in the bounding box, based on a visual. The human intervention came in to maximise efficiency; by using the robot's power and human's minimal adjustments and maneouvering.



sister topology - possible solution applied in TU Delft Campus location