

Architecture in Non-Place-Space

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The intention of the thesis is to explore how computational design and computer-aided design will influence the process of design and the future training of design students.

Typically the computer is metaphorically represented in conventional software applications as a retrofitted pencil—traditional software focuses on the computer as a tool for production rather than as a revolutionary new design instrument. The problem lies in the creative nature of design which lends itself to be an autonomous and unpredictable process from architect to architect, thus making software for design relatively marginal and difficult to produce. In a profit driven consumer industry the development of design software will follow alternative paths. The future development of design software will structure its attention to the creation of an open-system, allowing the consumer/designer to create his/her own application based upon his/her own process of creative envisioning. Therefore, this thesis is advocating, and an experiment within, the role of self designed program which allow the computer to become an essential design tool. The exploration of the thesis is to use computational design as a pedagogic method tied integrally to the process of thinking.

The process is also an exploration of the use of language as a tool for the realization of complex mental processes. If we as designers can train ourselves to use our hand as an extension of our brain, can we also use language to become the hand that designs for us? Students from the onset of his/her design education should be trained to interact with the computer on a programming level rather than being limited to the conventional structure of existing software—with more of an

emphasis on creativity and problem solving and using computational design as a tool to explore and to do the work. The future of 5th and 6th generation languages will allow design software to integrate programming as a way for individuals to customize packages. The vehicle and the medium to facilitate the process will be the disjuncture from complex programming code to the use of basic, recognizable and understandable spoken language.

Testing the Abstract—Project: Architecture in Non-Place-Space

The process includes programming, and writing compendium procedures within existing CAD and animation packages such as AutoCAD, 3dStudio, and Micro Station to take advantage of the commands and power within the software without having to develop the entire graphics based package. The thesis intent is to utilize computational design as a method to explore new options within architectural theory under the parameters defined within no-place-space. Non-place-space can be generated and defined in three different environments:

01 A virtual site located within the computer – without having the limitations, restrictions, and constraints of reality.

02 Various non-perceivable conditions existing within reality – for example non reflected light waves, radio waves, and the transforming conditions of the urban landscape.

03 Architecture of consciousness – inhabitation of the constructed ideas and thoughts situated in the mind.

Designing the Structure

The process begins by exploring how the forces, both internally and externally, effect the transformation of an amorphous urban condition over time. Urban conditions can be described topologically when demarcated by defining their bounding characteristics. These urban conditions can be the mapping of the

changing nature of land values, fluctuating crime rates, shifting demographics, the retrofitting of programmatic use in buildings etc. There are 2 important properties of these conditions:

01 They exist free from conventional boundaries within the urban setting – they are not determined (necessarily) by the layout of axis' or the traditional grid of the city.

02 The conditions exist as transforming and amorphous objects through time.

The project simulates these urban conditions and their development through the influence of internal forces within the condition and the causation of external forces transforming the object. As a result of describing the nature of a transforming entity, the object is mapped through time as an extrusion so the stacking of transforming sections would produce a volume of space and time to describe the condition. The subsequent experiment was to examine the intersections of developing urban conditions within the city. These intersections would represent the union of specific internal and external forces over a given section of space and time. These intersections then undergo a transformation to describe the existing temporal change of an object as perceived by humans conventionally – for example witnessing time and space transform immediately whereby past events exist only as a memory trace, and the future exists only as a partially predictable occurrence based upon the present descriptions of the trajectory and acceleration of the transforming object.

The structure for this transformation is to physically manipulate the object based upon its formal characteristics – for example analyzing the shape and structure of an object then transforming the object based upon the orientation and sizes of the faces from the influential variables of the shifting condition – these transformations were developed to represent architectural qualities of planes, volumes, and frames.

Application of the structure on an Urban Virtual Site

Once the structure was developed, the experiment was implemented on a virtual site. The site was created by scanning overhead photographs of urban sites within Los Angeles. The scans were translated from TIFF images to GIF bitmap files. The bitmaps were then read as objects, and transformed into a .DXF vector format – a basic raster to vector translation. The individual site objects (approximated buildings) once vectors were analyzed by their orientation, adjacencies, shared vertices, and by their size to be interpreted as architectural “building” form by the computer. Through the toggling of these variables a representation of an actualized extruded site is possible – with the objects having the properties of residential, commercial and industrial characteristics.

The transforming topological conditions are then applied and plotted over the three dimensional virtual city – the existence of these temporal conditions over areas in the city produced transformations on the site-objects within its respective conditional zones. Each use (residential, commercial, and industrial) is affected differently by each topological condition and is coded specifically based upon the condition’s own transforming development. The coded transformations are formally manipulated through the process of scale, rotation, and translation of the existing site objects vertices, or through a process of dividing the objects base 8 vertice into base 16, or base 64 vertice object – a process of diving all distances between the vertices at the midpoints. These transformations are then translated from triangulated surfaces into two-dimensional polylines and then extruded into space making volumes to represent potential characteristics of space. In the example and drawings provided, there are three changing conditions over a specific area in the virtual city:

01 One condition carries a frame transformation – changing the existing site objects into shifted frames.

02 Another condition carries a transparent transformation – transforming the existing site objects into shifted transparent objects.

03 The third carries a slid transformation – manipulating the objects representing a solid shift.

The final experiment focuses on the effects of the transformations of a smaller portion of the site. These objects undergo another transformation of extrusion, to begin to realize the potential of space forming – whereby sections of the objects can be taken and evaluated based upon the changing characteristics of the transforming conditions topologies.

Conclusion

The process, although as of yet, not founded in specific scientific principles, and simulates arbitrary data, is not meant to be viewed as an architectural solution or an urban solution, but a process of experimenting with computation programming as a design technique. It is an experiment to visualize the transformations not only within one's mind but within the computer. It is a way to show how a designer is imagining manipulating space and using computational design as a vehicle to express this condition. It is a way to explore alternative notions on how we view space, time, and architecture. Computational design will be a pedagogic instrument for students and professionals to explore new realizations within the process of design.