

THE SOFTWARE SAGA

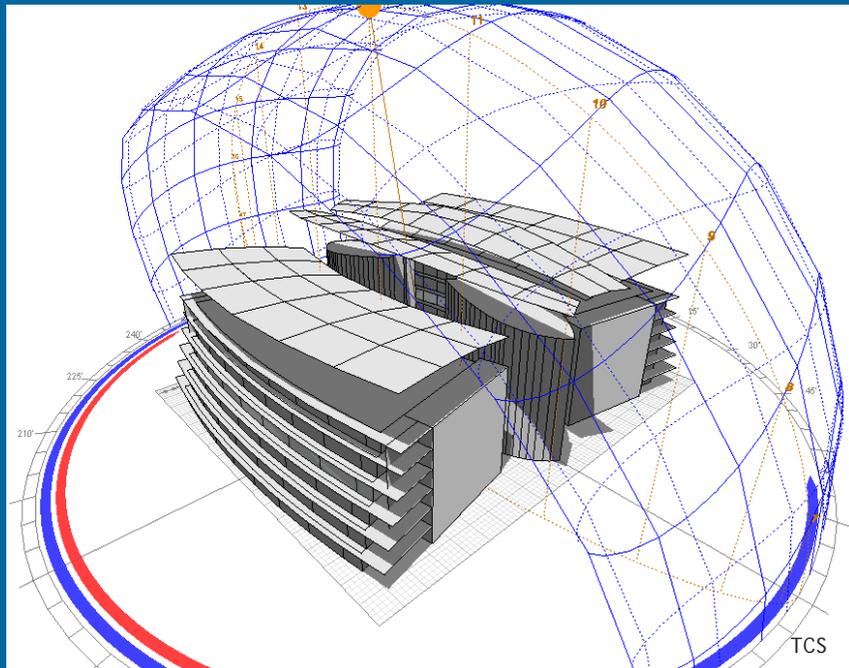
From being an aid, technology has become a part and parcel of every architectural practice across the world. Computer-based technology and specialised software have turned design on its head. Digital representation allows scope for drawing, rendering, modelling, performance simulation, design collaboration, and analysis – all at the click of a button!

Ar. Apurva Bose Dutta studies the advances in digital tools available for designers, lists the wide range of software available and attempts to figure out whether a computer can ever completely replace a drawing board

Advances in technology have, over the last few decades, left an indelible impact on the field of architecture. What started as computer-aided design is now often computer-mediated design. Along with the variety of computer software, there has been a dynamic growth in the complexity, intensity of detailing and extent of innovation. So much so that a profession that once relied on drawing boards and T-squares has today, more or less, shifted to computers.

Time-saving, innovative designs and free-flowing forms inconceivable by hand are often perceivable by specialised software. Cast a look at the designs of Frank Gehry, Zaha Hadid, Nuru Karim and Sanjay Puri, and one realises that technology has played a huge hand in providing possibilities much beyond what a pencil would allow.

Architectural 3D Views have become a unique mode of selling designs, not only for architects but also for developers. If we admit that the biggest change in architecture over the years has been the onslaught of technology, we also need to understand that the augmentation in the use of software has a lot to do with how differently buildings are being designed today. That said, most architects still like to sketch by hand and deem it important to retain drawing boards in their studios (even if only a single one in their cabins). After all, to imagine and design, one needs a pencil, not a computer.



Bangalore-based architect Sanjay Mohe believes in sketching and doodling the old-fashioned way, even though his firm, Mindspace, uses various digital tools in the design process. Citing the impact of technology, he says, "Commands and tools of software have replaced erasers and white ink, leading to a pause in the hesitance once associated with change. But for those who have been in this profession for some time, those days when making drawings was akin to craftwork will be missed. For them, there will be a feeling of loss of the many layers of personal memories that become attached to a drawing after working and reworking many times over, before

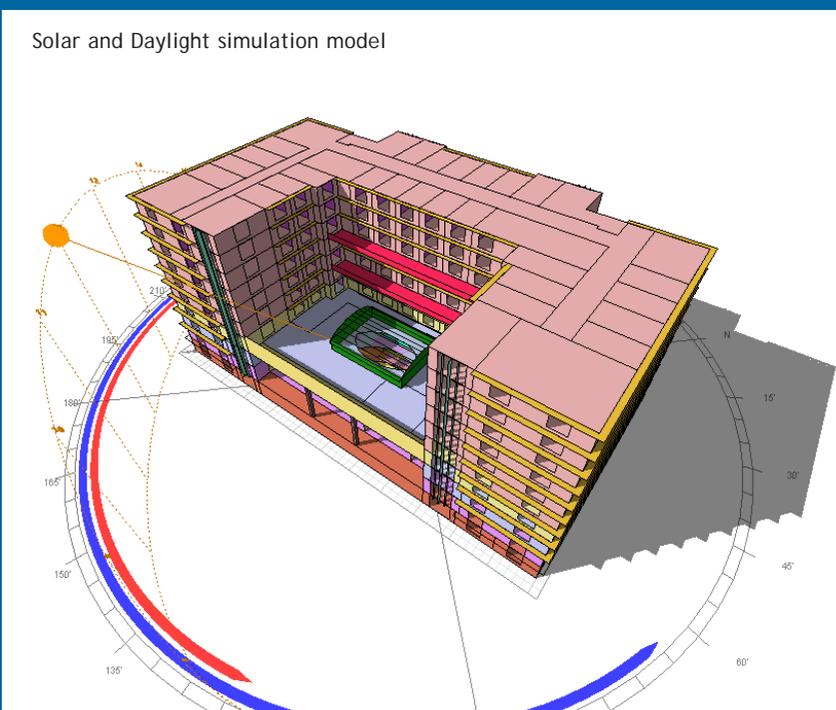
arriving at a satisfying result. Every drawing had the distinct signature of its author hidden in the many lines of rotring ink."

Architectural Rendering/ Architectural Illustrations or Architectural Modelling act as an interface between architects and their thoughts, providing a superior mode of understanding/ communication between the architect and his client through walkthroughs and perspective views, enabling a preview of spaces before the project goes on board. Such software provides an opportunity for working on varied options at a quicker rate, highlighting different spaces and different angles. The outcome, to a large extent, depends on the person handling such software — an intelligent combination of a number of diverse software can produce an ideal result.

Customisation Software is also available and enables a client to customise his materials/textures/ colours/furniture/plans. Bangalore-based developers The Total Environment have developed a similar customised software called eBuild. Developing such software is not easy job but once done is a lifelong hassle-free and time-saving aspect that can diminish the possibility of errors during construction.

Architectural Animation is a step further in the implementation of technology in architecture. While architectural rendering is restricted to a single image, Architectural

Solar and Daylight simulation model





Animation uses thousands of still images captured by a moving camera, thus producing a movie.

Such is the demand of architectural visualisations that many architecture students are now considering it a full-time profession. Rendering, a very painstaking job, needs lot of perseverance. A lot of architects/interior designers have in-house staff (architects, students, graphic designers, 3D artists) to create animations and renderings (exterior, interior 3D, environment and 3D furniture rendering). There are also architectural rendering companies to whom work can be outsourced. These firms generally involve people who specialise in various aspects of architectural rendering – animation, lighting, texturing etc.

Software on the Market

A wide variety is available, including options for 3D and 4D modelling, rendering, and Building Information Modelling (BIM) application software. India still lags compared to the software developed and used abroad – there, they have topology optimisation software to understand the structural behaviour of materials, Grasshopper to explore new shapes using generative algorithms, Autodesk's Photofly to create 3D models based on pictures, and Vectorworks Architect, a BIM solution.

Drawing/Modelling Software

Autocad has been a preferred software for 2D drawings but there now exist other software such as DraftSight, Bricscad and ZWCAD™ having similar features and commands.

Google SketchUp, a freely available non-professional software, is good for quick conceptual architectural presentations. It works well but is less realistic and incapable of producing organic shapes. Ar. Mohe's firm presently uses Autocad, 3D Studiomax, SketchUp and Revit, of which Mohe finds SketchUp the most user-friendly, with a easy learning curve helped by its user-friendly tools and uncomplicated workspace.

3D Studio Max, from Autodesk (also used for rendering), is very popular with architects and has different model libraries, besides offering lighting simulation, analysis technology, graphite modelling and texturing system. Software on the same wavelength as Max also has access to realistic third-party rendering applications. While they produce some high-standard animations and manipulations (a higher level of training is required), the software start-up cost is higher and the time required to produce a realistic perspective can always be longer. One needs to buy additional model libraries; they are not freely downloadable.

Other software includes Rhino (used for uninhibited freeform 3D modelling), Cheeta3D (also used for rendering and animation), Chief Architect (an architectural home design software with powerful building tools like automatic roofs, foundations, framing used for 2D and 3D projects) and FormZ (with the ability to quickly create different 3D shapes, including sculptured surfaces).

Rendering Software

Architectural drawings include renderings, panoramic renderings, light and shadow study renderings etc. Photoshop remains a favourite with everyone as a graphics editing application. 3D Studio VIZ is a comprehensive rendering program and can produce photo-realistic renderings required for product designs. AccuRender works inside AutoCAD and has enough options for shades, shadows, lighting and reflections; Art*lantis can import 3D models created in different programs and add lighting, textures, materials and colouring effects. Lightscape is used for lighting design and rendering.

Panchkula-based architect Haneet Khanna, founder of The 3rd Dimension - Architectural Visualizations Studio, specialises in animated walkthroughs, 3D views, aerial shots, 2D rendering of plans, site plans and elevations. According to him, some of the quantifiable advantages of 3D architectural rendering include uncompromised quality, accuracy in fine details, realistic simulation of lighting, materials etc., and the ability to exaggerate "selling points" in a design and to allow multiple vantage points.

Having experimented with a variety of software, he advocates Google



SketchUp (for very quick presentations), Rhino (for organic modelling) and Autodesk Revit, which he terms as the best BIM software at the moment. "We do use a lot of extra plugins and rendering engines that really improve and speed up our workflow. Some are offered for free on the Internet," Khanna says.

BIM Software

In BIM software, a virtual building model can be generated with structural elements like slabs, walls, roofs, etc from where plans, elevations, sections, construction details and bill of quantities can be generated. Any change in the model is automatically updated in the 2D drawings, thus making team work easy where the main model stays intact on the BIM server.

BIM software, now gradually penetrating into the Indian market, has made design studios experimentation labs, enabling innumerable permutations and combinations. However, this next-generation software remains expensive in India. Ar. Mohe says, "BIM software not only helps to coordinate between different service systems but also helps in resolving conflicts between structure and services."

Autodesk Revit, dominating all architectural offices today, has infinite solutions with designs, drawings, 3D models, presentations, quantity estimates, structures etc. and can also examine how the design interacts with sun, shadow and lighting. Generating contextual studies with finer nuances, it is hailed as the reason for the conceptualisation of some of the best known projects in

the world. Its newest version has better tools for renovation and retrofit projects; has the ability to divide a building element into parts reflecting how that element will be constructed; to group elements into assemblies and create sheets of different assembly views.

Revit® Architecture is integral to the process of designing in Bengaluru-based architectural firm Testing Waters Architecture. The principal architect's passion for the software can be gauged from the fact that two years prior to opening his studio, Vikram Subbaiah decided that Revit would be the software he would use. He candidly admits that everything with Revit and the concept of BIM has been an advantage — the elimination of the dependency on standard libraries of building elements, the excitement of creating customised parametric Revit families of the same without much difficulty, and Revit's capability of modelling linear structures and complex forms.

On disadvantages, Subbaiah says, "Consultants (structural, MEP etc.) will start using the BIM model only when more architects start working on it. Until then they probably would prefer 2D CAD drawings despite a complete virtual building model being available." Subbaiah is currently experimenting with the nucleus plugin for Revit, Grasshopper, and is keen to know about Gehry Technology's Digital Project.

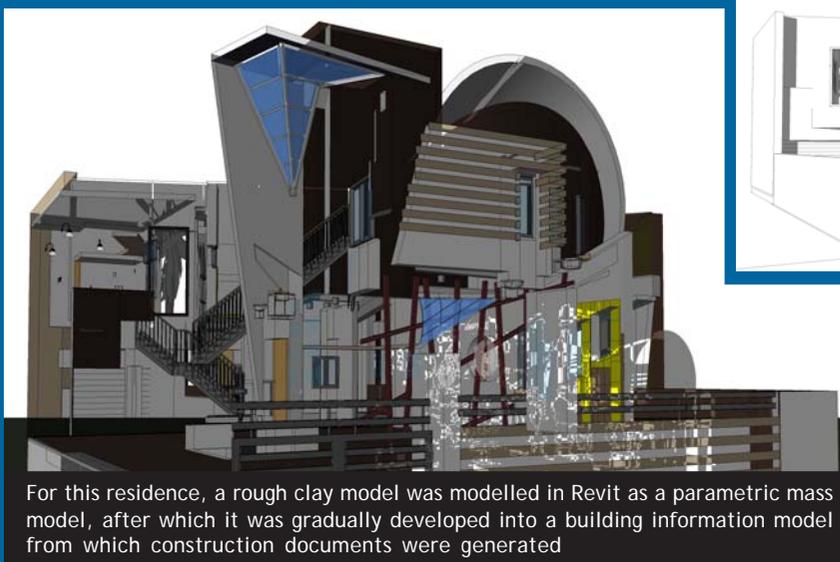
ArchiCAD, a 30-year-old software developed by Graphisoft, is an architectural BIM CAD software and has had numerous new versions almost every year; the

latest, ArchiCAD 15, was developed in 2011. The different versions of ArchiCAD have different enhancements — enhanced model-based collaboration capabilities by addition of a new shell tool and a revamped roof tool that allows modelling a broad spectrum of forms and complex roofs respectively; support for renovation projects with a new renovation palette; and a new tool with rotate orientation option to allow project views, floor plans or details to be rotated while keeping the project orientation intact.

Bentley Architecture, a BIM solution, is a part of Bentley's integrated suite of BIM applications (unlike standalone architectural software as above) that provides integration between design, engineering, analysis, construction, and operations for the entire lifecycle of facilities.

Amid architecture dominated by energy efficiency and green buildings, simulation software for various aspects like energy, daylighting, and HVAC design is the latest addition.

New Delhi-based Environmental Design Solutions, a green building consultancy firm, uses a range of such software for their work. Architect Gurneet Singh Monga, director of the firm, says: "We use Ecotect for site analysis, solar radiation, shading, and sun path analysis, and VisualDOE for energy analysis. While Ecotect is a comprehensive concept-to-detail



For this residence, a rough clay model was modelled in Revit as a parametric mass model, after which it was gradually developed into a building information model from which construction documents were generated



sustainable building design tool, VisualDOE is a powerful, easy-to-use front-end to DOE2.1E standard building energy simulation program. Other than that, we use Radiance (a highly accurate ray-tracing software system for daylighting and artificial lighting), Dayism (for daylighting), eQuest (for Energy Analysis), Energy+

for Detailed Energy Modelling) and Calculux(for exterior lighting and artificial lighting).”

An Alternative Field

Architectural visualisation is an emerging field and several budding architects are keen to plunge into it. The emphasis on computer education laid while acquiring an architectural degree has increased manifold, and colleges are vying for multimedia studios where drafting boards and computers can be worked on. A number of private training firms across the country give certifications for such programs. Some colleges have also initiated a masters in digital architecture so as to enable architects to rethink and reimagine the built environment. Various workshops and inter-country collaborations are also held to disseminate information on digital architecture. Websites and publications devoted completely to the research and analysis of such technology products are also popular.

Ar. Khanna, who established his firm after he graduated, says, “To create 3D digital renderings one doesn’t necessarily require any architectural background. One should have a grasp on understanding architectural drawings. I am an architect by qualification and in most of our projects clients always appreciate and welcome our design inputs into their ideas. Becoming a rendering artist might be a little easier without the requirement of having technical knowledge of structures, building materials and other aspects of architectural construction.”



A commercial project rendered in 3DS Max

Dream Software

Khanna agrees that a software can never replace a designer, adding that whether an image will look good or not depends on the aesthetic eye of the artist using the software, not on the software itself. The unanimous acclaimed disadvantage of such software is the excessive dependence of human minds on it, mitigating their own imaginations.

Reflecting on the fact that no software till date has been able to resolve the problem of scale, Ar. Mohe says, “The sensitivity to understand the scale has gone down as one can keep zooming in and zooming out of the drawing. When working on a hand-drawn drawing in a scale say, 1 in 20, the static workspace helps you to grasp the spaces and layout accurately and thus refine it inch by inch. That said, the limitless canvas of CADD makes it easy to understand the project at a macro scale.”

On his dream software, he says, “I believe that in architecture there is hand-mind coordination when one designs through sketching. I dream of a software which can read sketches and convert them to CAD form. iPad has come really close to that idea and I hope that very soon a software is developed that will preserve and celebrate the human element in the creative process.”

Khanna’s perspective, as a visualisation artist, is different. “We want something that can create accurate 3D models, lighting setups, fast rendering times and gives photorealistic results. But as an architect/designer I would want a software that is easy to use, can quickly make changes and one that makes design and drawing work easier.”

Ar. Monga is presently experimenting with IES-VE, an integrated analysis tool that does all types of detailed analysis with only one model. He feels that despite a number of software available, the only problem is the interoperability between different software. So when an architect needs to analyse his design for daylight and energy, he has to prepare separate models in separate tools. “I feel a design tool with modelling capabilities of SketchUp that is also able to analyse the design on various parameters and can finally generate plans, sections and elevations like Revit and Code compliance documents will be ideal,” Monga concludes. □



A housing project rendered in 3DS Max

Bangalore-based architect Apurva Bose Dutta is an architectural journalist. She writes for various national and international architectural and interior publications. She can be contacted at apurvabose@yahoo.com or reached at www.apurvabose.com