



جامعة الملك سعود  
كلية العمارة والتخطيط  
قسم العمارة وعلوم البناء

المقرر ٤٣١ عمر  
تطبيقات متقدمة للحاسب  
في التصميم المعماري  
Advanced Applications  
of Computers in  
Architectural Design

الخطة العامة

بسم الله الرحمن الرحيم

## البرنامج العام

### للمقرر ٤٣١ عمر - تطبيقات متقدمة للحاسب في التصميم المعماري

#### منهج المقرر

يركز المقرر بصورة أساسية على تطبيقات الحاسبات في مجال العمارة وذلك في المراحل المختلفة لتصميم وتنفيذ المبنى. ويركز بصورة أكثر على التطبيقات التي تؤدي إلى مبنى ذو أداء أعلى وتكلفة أقل أو التي تؤدي إلى تسهيل عمل المعماريين في مجموعات وتسهل تعاونهم مع مختلف جهات تنفيذ المشروعات باستخدام التكنولوجيا الحديثة والحاسبات.

#### أهداف المقرر

يهدف المقرر إلى:

- تعريف الطلاب بالتطبيقات المتاحة والتي تساعد المعماري في مراحل تصميم وإنشاء المباني والتي تتجاوز مجرد استعمال الحاسبات في الرسم والإظهار وكتابة التقارير (وهي التطبيقات التي صار المعماريون يكادون يحصرون استخدامها للحاسبات عليها).
- تأهيل الطلاب لمواصلة التعلم في مجال تطبيقات المتقدمة للحاسبات لمواكبة حيوية هذا المجال وتطوره السريع

#### وصف المقرر

يتضمن المقرر طرح ومناقشة الموضوعات التالية:

- تعريف بالمقرر وأهدافه.
- تعريف بالخلفيات التاريخية لتطبيقات الحاسبات.
- تعريف بمنظومة التصميم والتعريف بتكنولوجيا المعلومات ومكوناتها.
- التعريف بتطبيقات الحاسبات في التحليل والتقييم.

- التعريف بتطبيقات توليد الأشكال والتصميمات.
- التعريف بتطبيقات الحاسبات في الرسم والإظهار والرفع المساحي والتوثيق.
- التعريف بتطبيقات التعاون والتواصل وتنظيم المشروعات.
- الوضع في العالم العربي من حيث استخدام تطبيقات الحاسبات.
- نظرة مستقبلية

## التقويم والدرجات

سيتم تقويم الطالب حسب المعايير التالية:

- |          |                                |
|----------|--------------------------------|
| ١٠ درجات | • التفاعل والمشاركة            |
| ٢٠ درجة  | • اختبار نصف الفصل             |
| ٣٠ درجة  | • التقارير والتقديم والمناقشات |
| ٤٠ درجة  | • الاختبار النهائي             |

## المراجع

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## الجدول الزمني

الأسابيع	الندوات	مهام الطلاب
الأسبوع الأول	- تقديم عام وتعريف بالمقرر وأهدافه	- تحديد منسق المقرر - عمل مجموعة الواتساب
الأسبوع الثاني	- الخلفيات التاريخية لتطبيقات الحاسبات - منظومة التصميم وتكنولوجيا المعلومات ومكوناتها	- تعريف بالمهام المطلوبة من الطلاب - اختيار موضوعات المهام والبرامج
الأسبوع الثالث	تطبيقات الحاسبات في التحليل والتقييم	- التقديم الأول: عرض تقديمي.
الأسبوع الرابع	تطبيقات توليد الأشكال والتصميمات	- التقديم الثاني: عرض تقديمي.
الأسبوع الخامس	تطبيقات الحاسبات في الرسم والإظهار والرفع المساحي والتوثيق	- التقديم الثالث: عرض تقديمي.
الأسبوع السادس	تطبيقات التعاون والتواصل وتنظيم المشروعات	- التقديم الرابع: عرض تقديمي.
الأسبوع السابع	اختبار نصف الفصل	
الأسبوع الثامن	الوضع الحالي في العالم العربي من حيث استخدام تطبيقات الحاسبات	- التقديم الخامس: عرض تقديمي.
الأسبوع التاسع	الخلاصة ونظرة مستقبلية	- التقديم السادس: عرض تقديمي.
الأسبوع العاشر		- التقديم النهائي - تسليم العرض التقديمي بصيغة باوربوينت مع كل البرامج والمقاطع والمراجع المستخدمة في مجلد الطالب بحاسب المحاضرات
الأسبوع الحادي عشر		
الأسبوع الثاني عشر		

**التمرين****مقدمة:**

يواجه المعماري في هذا العصر تحديات كثيرة تحتم عليه مواكبة التطور التكنولوجي وخاصة في مجال الحاسبات وتكنولوجيا المعلومات. لذا وجب على المعماري الناجح أن يكون دائم الاطلاع على أحدث ما في مجاله من تقدم في استعمال الحاسبات وخاصة فيما يتعلق بأحدث التطبيقات Applications وأفضل الممارسات Best Practices وكذلك أحدث ما تمخضت عنه المؤتمرات والمعارض والبحوث. وهذا ما شكل هدف هذا التمرين. ولتحقيق هذا الهدف يقوم الطالب بالاطلاع على كل ما يتعلق بأحد تطبيقات الحاسبات في مجال العمارة من مقالات وعروض تقديمية ونشرات وأفلام ثم يعد ترجمة وملخص ونقد وعرض تقديمي ومقاطع فيديو عما قرأ وتعلم ويقوم بتسليمه في صورة إلكترونية ويقوم بعرضه على باقي الطلاب في صورة محاضرات قصيرة.

**أهداف التمرين:**

- أ. فهم أحد برامج الحاسبات الخاصة بالعمارة والقدرة على شرح ذلك.
- ب. التعرف على آخر اتجاهات Trends وأدوات Tools وتطبيقات Applications وممارسات Practices في مجال استخدام الحاسبات وتكنولوجيا المعلومات في العمارة.
- ج. تعزيز قدرات الطلاب على البحث والنقد وإبداء الرأي.
- د. تعزيز قدرات الطلاب على فهم اتجاهات التكنولوجيا والتماس الاتجاهات المستقبلية.

**المطلوب من كل طالب:**

اختيار أحد برامج الحاسبات الخاصة بالعمارة وعمل التالي:

- أ- يعد الطالب عرض تقديمي
- ب- يعد الطالب بنفسه مقاطع فيديو مشروحة ويقوم بتحميل مقاطع الفيديو على موقع المقرر باليوتيوب.
- ج- تجميع الأفلام التعليمية في مجلد خاص. وتضمين الوسائط الشارحة للبرنامج من يوتيوب بالعربية والإنجليزية في العرض التقديمي.
- د- تجميع الوثائق الشارحة للبرنامج لإعطاء فكرة مبسطة عن كيفية عمل البرنامج في مجلد خاص.

**العرض التقديمي ومقاطع الفيديو التي يعدها الطالب بنفسه تشمل:**

- ١- تعريف بالبرنامج واسم شركته وإصداراته ونظم التشغيل المناسبة وكيفية الحصول عليه للطلاب.
- ٢- اختيار تصنيف البرنامج من الموضوعات التالية:

أ- أدوات التحليل والتقييم A- Design analysis and evaluation tools

- ب- أدوات توليد الأشكال B- Form generation tools
  - ج- أدوات الرسم والإظهار C- Drawing and rendering tools
  - د- أدوات التشارك والتواصل D- Collaboration tools
  - هـ- التعليم المعماري E- Architectural education tools
  - و- أدوات إدارة المكتب وأدوات إدارة المشاريع وأدوات إدارة المنشآت F- Project, job, and facility management tools
  - ز- موضوعات متنوعة أخرى Miscellaneous
- ٢- شرح أهم وظائف البرنامج.
- ٤- شرح أوامر البرنامج وعمل أمثلة توضح ذلك.
- ٥- شرح لطريقة تشغيل البرنامج وكيف يتم عمل مشروع معماري صغير به.
- ٦- شرح مزايا البرنامج الواضحة.
- ٧- المقارنة بين البرنامج وبين البرامج الشبيهة إبراز وشرح المزايا والعيوب.
- ٨- مناقشة خلاصة الانطباع الذي تراه عن البرنامج
- ٩- مناقشة أفضل السبل للاستفادة منه.

هام: رجاء التأكد من أن الترجمة التي تقوم بها يمكن قراءتها وفهمها وأسلوبها جيد، حيث انه لوحظ أن بعض الطلاب يستعملون بعض أدوات الترجمة الآلية والتي تؤدي إلى ترجمة رديئة لا يمكن فهمها. كما يراعى في الترجمة العربية وضع كل الصور بالإضافة إلى التعليقات الموجودة أسفلها مترجمة حيث أن ذلك يعينك كثيرا في العرض التقديمي.

## جدول البرامج والمجالات

(ويمكن للطلاب اقتراح برامج أخرى بشرط أن تكون متقدمة)

رقم الطالب	نوع البرنامج	اسم البرنامج	رقم
	Specification Writing	<ul style="list-style-type: none"> <li>e-Specs <a href="http://e-specs.com">e-specs.com</a></li> <li>MasterSpec <a href="http://arcomnet.com">arcomnet.com</a></li> </ul>	١
	Rendering And Animation	<ul style="list-style-type: none"> <li>Lumion</li> <li>Artlantis Studio</li> </ul>	٢
	Rendering And Animation	<ul style="list-style-type: none"> <li>Luxion's KeyShot™ for CAD</li> <li>Maxwel Render</li> <li>VRay</li> <li>Kerkythea</li> <li>Cinema 4D Studio</li> </ul>	٣
	Modeling tools	<ul style="list-style-type: none"> <li>Rhinoceros 3D</li> <li>Form Z</li> <li>Sketchup &amp; Plugins</li> <li>Autodesk® Maya®</li> <li>Autodesk® 3DS Max®</li> </ul>	٤
	Advanced Modeling Algorithmic Design and Generative Components	<ul style="list-style-type: none"> <li>Rhinoceros + Grasshopper</li> <li>Bentley Generative Components</li> <li>3DS Max + Para 3D</li> <li>Revit + Dynamo</li> </ul>	٥
	BIM architectural design tools	<ul style="list-style-type: none"> <li>Autodesk Revit® Architecture + Plugins</li> <li>ArchiCAD + Plugins</li> <li>Gehry Technology's Digital Project™</li> </ul>	٦
	BIM architectural design tools	<ul style="list-style-type: none"> <li>Bentley Architecture <ul style="list-style-type: none"> <li><a href="#">MicroStation</a></li> <li><a href="#">MicroStation PowerDraft</a> -</li> <li><a href="#">Bentley View</a> -</li> <li><a href="#">MicroStation GenerativeComponents Extension</a></li> </ul> </li> <li>Nematschek Vectorworks®</li> </ul>	٧
	4D Simulation	<ul style="list-style-type: none"> <li>Navisworks</li> <li>Synchro</li> <li>Vico Office</li> </ul>	٨
	Environmental Analysis	<ul style="list-style-type: none"> <li>Ecotect Simulation and Analysis</li> <li>IES Virtual Environment</li> <li>Climate Consultant</li> <li>Design builder</li> </ul>	٩
	Crowd Management (Normal and Evacuation)	<ul style="list-style-type: none"> <li>Legion</li> <li>MassMotion Oasys</li> <li>Crowd Dynamics</li> <li>InControl Pedestrian Dynamics</li> <li>Steps</li> <li>SimWalk</li> <li>Simulex</li> </ul>	١٠
	Project Management	<ul style="list-style-type: none"> <li>Microsoft Project</li> <li>PERT Master</li> <li>Primavera Enterprise Project Portfolio Management</li> </ul>	١١
	Photo Retouching	<ul style="list-style-type: none"> <li>Adobe PhotoShop</li> </ul>	

## بعض المواقع المفيدة:

### BIM Architectural design software : 30 Websites

<http://www.arch2o.com/bim-architectural-design-softwares-30-websites-you-should-visit-weekly/>

#### Blogs

**BIM 360 Blog**: A blog by Autodesk that keeps you up to date with the latest Autodesk BIM 360 feature news, expert tips, and insider resources.

**Shoegnome**: For beginners level, Jared Banks' website aims to showcase innovation within the building industry and offer insights into BIM technology. The website features a variety of YouTube tutorials and articles.

**AEC DevBlog**: AEC Devblog is a good resource for managers and developers using Revit, Navisworks, and other Autodesk AEC (Architecture, Engineering, and Construction) and BIM. The blog is run by Autodesk's Developer Technical Services (DevTech) team.

**Beyond Design** : aims to showcase innovation within the building industry and offer insights into BIM technology since 2009. It's run by Autodesk's Navisworks team and covers a variety of tips and tricks, best practices, and insider knowledge to make the most out of BIM software and management.

**BIM Fix Blog** : Australia's BIM community could get the most recent BIM updates through this blog. BIM Fix Blog may only update once a month, but it posts very useful BIM tips and tricks, every article is worth it!

**Revit Add-ons** : Tim Grimm covers Revit add-ons and plugins, many of which are free.

**The Revit Kid**: Good blog for tutorials and tips ! offering a combination of video and text based instruction for novices and seasoned veterans. It also has numerous pages of relevant content, and supplemental material such as a newsletter, and (paid) ebooks and videos.

**Bond-Bryan BIM Blog**: Good all round ! BIM site by Bond Bryan's Rob Jackson that offers lighthearted industry stories. They also cover BIM initiatives, tips and tricks, and promote relevant conferences and industry awards.

**HOK BIM Solutions** – HOK are one of the leaders in BIM. David Light @davewlight looks after BIM in London and is a regular on the BIM event circuit.

**Revit** Everything Technology by David Light



[The Case for BIM](#) – [Casey Rutland](#) is an Architect and Associate Director at Arup Associates, specialising in BIM project design, delivery and management.

[Construction Code](#) runs by Stephen Hamil, who offers BIM advice while also cataloging his own professional life.

[Epic BIM](#) – multiple contributors whose philosophy is Keep It Simple Stupid !

## Publications

[AECbytes Magazine](#) *AECbytes* is offering a quarterly print magazine for \$49 a year. They also keep an [updated blog](#).

[Automation in Construction](#) This international, research-oriented journal focuses on information technologies in construction. They particularly focus on computer-aided design. Readers can order a year's worth of print articles for \$99.

[Cadalyst](#) *Cadalyst's* quarterly print magazine provides software and hardware reviews, illuminates technology trends, and delivers expert advice to help CAD and BIM managers stay up-to-date. Each issue is \$9.95 and \$2.25 for shipping and handling.

[AECMagazine](#) *AECMagazine* is a free online UK magazine that publishes bi-monthly. It keeps readers up-to-date on the latest technology solutions in architecture engineering, and construction.

[Constructech](#) This magazine zeroes in on the intersection of construction and technology (for example, the latest issue features an entire app catalog that's sorted by how relevant it is to certain professions). It is published every other month.

[AUGIWorld](#) *AUGIWorld* is Autodesk User Group International's official magazine which is published once every two months. This in-depth publication provides specialized insight into topics like CAD management, AutoCAD add-ons, and management advice. *AUGIWorld* is reserved for AUGI subscribers only.

## BIM Free Object Libraries

### [ARCAT](#)

For CAD and BIM resources, ARCAT is a one-stop-shop. Their free, no registration system has everything from concrete to pollution control system.

[Autodesk Seek](#) A large library of mostly non-generic multi-disciplinary components by Autodesk. Users can quickly find product specifications for over 66,000 commercial and residential building products.

[The National BIM Library](#) The National Bim Library offers a collection of free to download generic BIM components that are compatible with the major BIM products. NBS are better know for their specifications but have taken a strong interest in BIM

recently. The library is still a little sparse but the basics are in place for a very useful resource.

[RevitComponents](#) Some useful free components especially strong on furniture and interiors.

[Revit City](#) This site has been going a while and there are 1000's of components to download. You need to register in order to be able to download components.

[TurboSquid](#) This site offers components which you pay for but there are a small amount of free items. TurboSquid have a Revit certification system that ensures the components meet minimum standards. Compare the prices to the time you might spend modeling the items.

[Bimstore](#) The Bimstore offers a library of BIM content by manufacturers in Revit, Microstation and ArchiCAD format. The content is free to download. You will need to register on the site first. They have an excellent guide to content creation.

[CAD Notes](#) Very useful website maintained by Edwin Prakoso on everything related to AutoCAD, Microstation and Revit.

[Polantis](#) Polantis is a free-to-use BIM library that is fantastically organized and simple to use. While its library is a little smaller than others on this list, it's easy to find exactly what you're looking for.

[SmartBim](#) SmartBim offers product models from over 40,000 families types in 10,000 Revit objects. Need a sprinkler? It's an entire category. An ice maker? They got 'em. A hospital bed? They've got four!

## Photoshop Architectural Rendering : 10 Websites

<http://www.arch2o.com/photoshop-architectural-rendering-10-websites-you-should-visit-weekly/>

10 Photoshop tutorials websites, which we hope will help you to discover new work techniques and better ways to apply.

1. If you are new to photoshop, [this 30 minutes online video](#) will walk you around the basic interface and how to set up Photoshop. [The whole series](#) will be even more beneficial if you want to start from scratch.

2. [CGarchitect](#) is one of the most influential websites and end-user community for architectural visualization and design professionals. Whether you use SketchUp, Blender, Civil 3D, 3D Max, Rhino or any other 3D modeling program, the site remains steadfastly dedicated to providing valuable resources and tutorials for architectural visualization artists.



Making of the Kamppi Chapel by Jeff Mottle – Courtesy of [cgarchitect.com](http://cgarchitect.com)

3. [RonenBekerman.com](http://RonenBekerman.com) is a helpful source of learning on all aspects of 3d architectural visualization. There you will find articles & tutorials about 3d modeling & 3d rendering with software such as 3ds max, Maya, Cinema 4D, Modo, SketchUP, V-Ray, Maxwell Render, Corona Renderer, Photoshop and more. In this [link](#) you will find 12 Postwork Style Architectural Visualization Tutorials that we would highly recommend you to visit !



Courtesy of [Ronen Bekerman](#)

4. If you are looking for a website to [brush up on some of your Photoshop](#) and SketchUp skills then you should visit [visualizingarchitecture.com](#) by Alex Hogrefe. Alex simply shows you a quick and effective method of turning a simple SketchUp render into something life-like and photorealistic. The website also has a youtube channel that [have very few tutorials](#) worth your visit.



Courtesy of [visualizingarchitecture.com](http://visualizingarchitecture.com)

5. [Sketchup Artists](#) is another great source of [tutorials for you if you are using Sketchup](#). The website has many tutorials that provide you with post-processing skills, techniques and easy-to-follow step-by-step instructions provided by highly talented professional contributors.



Courtesy of [Sketchupartists](#)

6. [PixelFlakes](#) is a small but powerful rendering firm that produces high-quality render techniques, especially using Photoshop. Their site is a combination of a portfolio, blog, and tutorial guide. The best part of their site is watching the Monthly 1-hour Challenge, where all the artists at Pixel Flakes spend 1 hour a month doing a rendering. They work for Foster, BIG, Aedas, Arup, and many others. In this tutorial, [Shipyards Postwork Breakdown](#), PixelFlakes simply shows you a quick and effective method of turning a simple render into something life-like and photorealistic.

#### **Post Work Breakdown/Render A 3D Model by Ronen Bekerman – PixelFlakes**

7. [Digital arts online](#) is a great source of inspiration for digital artists around the world. [This tutorial](#) will walk you around the basic Photoshop techniques that focus on blending a CG building constructed in Modo and rendered using Rhino into a real photo. Andreas A Tjeldflaat takes you through the post-production steps of an architecture rendering in Photoshop.



Courtesy of [Digital Arts Online](#)

8. [Photoshop.Architect's](#) is a youtube channel that features very few number of tutorials in Photoshop, but it helps you learn the essential parts of doing collages, unconventional rendering practices and post processing in Photoshop. Another two helpful YouTube channels that you might need to check are [ARQUI9 Visualisation](#) and [Adam Kormendi](#) , both feature tutorials in Photoshop which cover advanced techniques for adding realistic details.

9. [CGArena](#): Under CGArena's "free staff" tab is their [tutorials section](#), which has many tutorials that show the visualization artist's production process from a digital model to a completed image. Most of the tutorials on this website are architectural, but others show the design and visualization process for different fields, which could provide insight into different methods of working.



Courtesy of [CGArena](#)

10. [Evermotion](#): With tutorials on Zbrush, Blender, Cinema 4d, [Photoshop](#), [3ds Max](#), and many other software, Evermotion.com offers a fairly large collection of [free online tutorials](#) in addition to a [“Making of” section](#) that go into greater detail on visualization topics. Evermotion regularly features contributors who showcase their own work, explaining how they created a single render from the modeling stage to post-production.



Making of City Winter Night – Courtesy of Kamil Kuklo – Evermotion.com





## Revit for Architects : 21 Sites to Download Revit Families for Free

<http://www.arch2o.com/revit-architects-21-sites-download-revit-families-free/>

If you're new to drafting and design you're probably familiar with [Revit](#) by now, or you at least heard of it. AutoCAD has been around since the 1980's and since it's introduction has eventually become ingrained in the DNA of most design firms and offices and has become an integral part of the day-to-day activities of the design process. It was almost 20 years later that Revit was introduced to the public. It's acceptance in the design and construction industry was a gradual one but overtime more and more professionals began making the transition or included Revit in their workflow.

We all need good content to populate our models, and if they are Free then even better! Here we are trying to help the Revit community by adding up a list of the most valuable resources to download Revit Families for free .

### 1. [RevitCity](#)

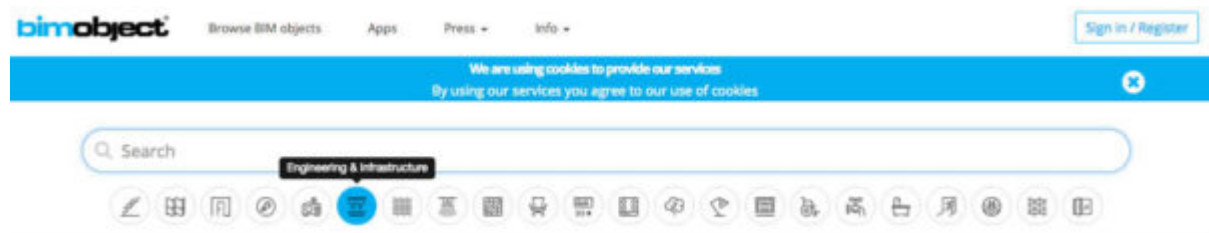
RevitCity is not just a place to download free Revit families, but it is also a central place where you can get your questions answered, share your latest ideas or creations, and easily find the content you are looking for.

## 2. [RBI Water Heaters](#)

Mestek has created a library of BIM objects for free download and use by the design community. Objects are available in the Autodesk Revit MEP .RFA format, and many objects are also stored as .ZIP files. Please note that some objects require the saving of both an .RFA file and a .TXT file in order to function correctly.

## 3. [BIM Object](#)

BIMObject is one of the world's largest and fastest growing digital content management system for BIM objects. According to the website, you can download 33,837 product families, 244,292 parametric BIM objects and 16,493,712 products.



## 4. [Smart BIM Library](#)

Another pretty good site with a large range, and easy to find Revit families. Both manufacturer specific and generic content, this is a great site to check out.

## 5. [CAD Forum](#)

CADforum has a CAD/BIM block library with more than 13.000 blocks. Also, it has some tips for AutoCAD 2017, Revit 2017 and Inventor 2017.

## 6. [Modlar](#)

Modlar has a large collection of manufacturer specific products to use with your projects. It is all completely free, you just need to be [signed in](#) to download the files.

## 7. [SpecifiedBy \(UK\)](#)

This is a great resource for manufacturer specific content from a huge range of product categories. They claim to have "the largest library of BIM content in the UK", and the site is easy to navigate, search, and filter to find exactly what you're looking for.

## 8. [ARCAT](#)

For CAD and BIM resources, ARCAT is a one-stop-shop. Their free, no registration system has everything from concrete to pollution control system.

## 9. [BIMetica \(Spanish\)](#)

Again, another BIM library with a large amount of Revit families. Some categories are empty however which can be annoying!

## 10. [Autodesk Seek](#)

A large library of mostly non-generic multi-disciplinary components by Autodesk. Users can quickly find product specifications for over 66,000 commercial and residential building products.

## 11. [The National BIM Library](#)

The National Bim Library offers a collection of free to download generic BIM components that are compatible with the major BIM products. NBS are better known for their specifications but have taken a strong interest in BIM recently. The library is still a little sparse but the basics are in place for a very useful resource.

## 12. [RevitComponents](#)

Some useful free components especially strong on furniture and interiors.

## 13. [TurboSquid](#)

This site offers components which you pay for but there are a small amount of free items. TurboSquid have a Revit certification system that ensures the components meet minimum standards. Compare the prices to the time you might spend modeling the items.

## 14. [BIM Catalogs](#)

A good place to find manufacturer specific content, a bit hard to navigate and find products without knowing the manufacturer first. Worth a look however.

## 15. [Polantis](#)

This site offers a huge range of 3d content, however a lot of the Revit families are not "true" Revit families, in the sense they have been created in other 3d programs and just imported and saved as a Revit Family file. Good site if your just after content for visualization purposes.

## 16. [BIMbox](#)

Another great site from the UK, BIMbox have a decent amount of Revit content available for Free download. Most of the content is geared towards interiors (Sofas, Tables, Shelving etc.) and the site is well presented. Most Revit content is IFC compliant which is great.

## 17. [Familit](#)

RFA files are family files that can either be loaded using Revit familyManager into a project or saved externally. At the moment familit.com offers **18.000 free families** in English, German and French language.

## 18. [BIM Catalogs](#)

A good place to find manufacturer specific content, a bit hard to navigate and find products without knowing the manufacturer first. Worth a look however.

## 19. [Bimstore](#)

The Bimstore offers a library of BIM content by manufacturers in Revit, Microstation and ArchiCAD format. The content is free to download. You will need to register on the site first. They have an excellent guide to content creation.

## 20. [CAD Notes](#)

Very useful website maintained by Edwin Prakoso on everything related to AutoCAD, Microstation and Revit.

## 21. [RubySketch](#)

This site has a lot of SketchUp content – but also a whole heap of Revit families as well. A diverse range of products, with lots of Mechanical & Plumbing fixtures.



## Architectural Rendering software : Most Helpful 2D and 3D Web Resources

<http://www.arch2o.com/architectural-rendering-software-most-helpful-2d-and-3d-web-resources/>

### Architectural Rendering software : Most Helpful 2D and 3D Web Resources

You can not get enough cutout people or 3D models and textures for your renders. Yet, spending more than 20 minutes Googling images for a specific texture or 2D people can become a breaking point for many. Any way to save time in this field is a big advantage, especially for students in school. The thing is, there are a lot of free resources online that have already put in the hard work so that you don't have to. Many of these sites were life savers going through architecture school.

Below are some of our favorites websites containing free cutouts and 3D models and textures. Some of these resources made the list because of their clear organization of the information. Often, there are very specific demands of a project or client that require lots of time online searching. We are always looking for more resources so if there are any that we missed, send us an email or leave a comment. You can never have enough entourage!

## Free 2D People , vegetation, vehicles, and more..

- [Escalatina](#) –Database for Latin-American architects to populate their renders with local figures
- [Nonscandinavia](#) – Free Hi Res 2d Cutout people from around the world
- [Cut Out Life](#) – Database of render people of various ethnicities
- [Cut Out People](#) – Free cut out people, animals, transport, nature and objects
- [Skalgubbrasil](#) – Database for Latin-American architects to populate their renders with local figures.
- [Skal Gubbar](#) -Library of free high resolution cutout images of people
- [Mr. Cutout](#) – Database of render people, vegetation, vehicles, objects and more.
- [CadTutor](#) – Free collection of images, trees, people, skies and more.
- [Flyingarchitecture](#) – V-Ray textures which include bump and displacement maps.
- [Designfreebies](#) – Free high resolution photos of skies, clouds, sunsets and much more.
- [Immediate Entourage](#) – Such a great site to find a large collection of cutout people.
- [XOIO AIR](#) – Large collection of office scenes, coffee scenes, people scene from above, people scene from below, etc.
- [Gobotree](#) – A large and growing library of free images and cutouts created by the people at [Vyonyx](#)

## Free 3D Models and Textures

- [Onecommunityglobal](#) – a list of the most realistic plants optimized for SketchUp
- [Coalesse](#) – free furniture models for non-commercial use.
- [cgtrader.com](#) – Huge collection of excellent quality 3D models, free and paid for
- [Hdri-Skies.com](#) – Good collection of free HDRI sky maps in 4K resolution
- [TonysTextures](#) – 4000 free textures and several tutorials and other freebies for architectural visualization.
- [Swtexture](#) – Free high quality wood texture
- [Archive 3D](#) – Large collection of free 3D models
- [3Dup.com](#) – Free Grasses and weed models in 3ds, very useful!
- [Bricks'n'Tiles](#) – Design Photo-realistic textures for high quality 3D content
- [CGDigest](#) – Selection of models from furniture to transport and electronics
- [Turbosquid Free](#) – Loads of good quality free models
- [CG Textures](#) – The worlds largest free texture site
- [Archi-Vision Studio](#) – Watercolor entourage images (skies,trees, bushes, people and cars)
- [3dmd.net](#) – Free textures for 3D artists
- [3Dmodelsharing](#) – Free library once you register, various file types
- [Archweb](#) – Free cad blocks and textures
- [HDRI-Hub](#) – Small collection of free HDRI skies.
- [Gtrove](#) – Small collection of free HDRI's

- [NoEmotion HDR's](#) – Free collection of day, evening and night HDRI's
- [Krost Office Furniture](#) – Free collection of SketchUp models
- [SketchUpTexture](#) – Growing collection of free good quality models and textures
- [Knoll Office Furniture](#) – Free SketchUp models...100's of them
- [3drender.co.uk](#) – Some free samples and models
- [Textures Forrest](#) – High resolution free textures
- [DesignBeep](#) – Collection of high quality and free brick textures
- [High Resolution Textures](#) – Free Textures, game textures, 3D textures, design resources
- [Texturemate](#) – Free textures, brushes and patterns
- [carbodydesign.com](#) – Free 3D car models various formats, some SketchUp models
- [BIMstop.com](#) – Free models, but you need to register first
- [SteelSelect.com](#) – Free SketchUp Component library for eaves guttering
- [Landscapeforms](#) – SketchUp library of 3D models
- [Render Textures](#) – Seamless diffuse, bump and displacement maps
- [OpenFootage](#) – HDRI panorama's and more
- [Graphic Mania](#) – High quality old paper Photoshop textures
- [Grunge Textures](#) – High quality textures, metal, brick, concrete, stone, asphalt, wood and more
- [Smartibl](#) – Some HDRI's and other goodies
- [Naldzgraphics](#) – Free high quality wood textures,200+
- [Designmoo](#) – Free PSDs, vectors, textures, patterns, fonts, and more
- [LeMog](#) – Free texture library (French)
- [CadYou](#) – Free 3D models textures and Cad Blocks
- [Vyonyx](#) – Cutout people, trees, textures and tutorials
- [Archiforge](#) – Textures and CAD library
- [3D Warehouse](#) – Huge collection of free 3D SketchUp Models
- [Appiani](#) – Free 3D library and textures

## Top Free Apps for Architects to have in 2017

Top Free Apps for Architects to have in 2017  
Smartphones have become an essential part of our daily lives. The rapidly growing mobile technology is paralleled by countless innovations in the mobile application development. These innovations have extended to the field of architecture. New handy apps and enhanced versions of already existing apps are developed yearly. These apps cover architecture related activities like sketching, 3D modeling, photo editing, and other stuff that might not have crossed your mind. So, here we provide you with a list of the best architecture apps to have on your smartphone in 2017.

<http://www.arch2o.com/top-free-apps-for-architects-to-have-in-2017/>

- **Recommended free apps for architects:**

1. **[Morpholio Trace](#)**

This app functions like a tracing paper. It allows users to draw on imported images and add comments and pointers on separate layers. It is very popular and handy. It works on iPad Pro and requires Apple Pencil for sketching.

Download from: [iTunes](#)

2. **AutoCAD 360**

AutoCAD 360 is used for viewing and editing 2D and 3D drawings, in addition to other helpful tasks like taking measurements on site and annotating drawings. It can be used for faster communication since the edited and annotated images can be shared through the app.

Download from: [iTunes](#), [Google](#)

3. **BIMx by Graphisoft**

BIMx gives its users prompt access to all the detailed documentations of a BIM project. The popular app is characterized by a user-friendly interface. It combines the best of both, BIM and mobile technology.

Download from: [iTunes](#), [Google](#)

4. **Sketchbook by Autodesk**

Sketchbook is an easy-to-use app for all kinds of users interested in drawing and painting. One of its advantageous features is the time-lapse recording tool. It can help architects with explaining their design ideas through the recorded sketching process.

Download from: [iTunes](#), [Google](#)



## 5. Shapr3D

Shapr3D is a 3D CAD tool for iPad Pro. It enables its users to draw sketches fast and easy, then turns them instantaneously into 3D forms. The app has a user-friendly interface, controlled by the thumb and the Apple pencil. According to the developers, the app is highly accurate and built for professionals.

Download from: [iTunes](#)

## 6. MagicPlan

This app generates interior plan drawings by detecting the walls and openings. All the user needs to do is stand in the middle of a room and take pictures of its corners. The pictures are turned into “95% accurate” measurements and plans. Furniture can be added to these plans, which can be later exported to PDF, JPEG, or DXF formats.

Download from: [iTunes](#), [Google](#)

## 7. Autodesk FormIt

This Autodesk App is part of the Revit package and meant to be part of the BIM process. It provides its users with helpful site information which makes it easier to generate contextual forms and decide on other early design related issues.

Download from: [iTunes](#), [Google](#)

## 8. Archisketch

The neatly designed app, still undergoing development, allows its users to import images and draw on them to scale, which is the new part. The app offers its users new handy specifications with every update.

Download from: [iTunes](#)

## 9. Arrette Sketch

This app can be used for sharing and digitally reviewing drawings and sketches. It allows its users to make incremental changes on designs and drawings, without the need for printing and tracing paper.

Download from: [iTunes](#).

## 10. Concept by Fast and Epp

Concept gives its users instantaneous calculations for the dimensions of various structure systems, based on the ratio between span and depth. It also shows the user existing projects employing similar structure systems, making it easier for them to visualize how their own designs would actually look.

Download from: [iTunes](#).

## 11. ArchiSnapper

This app is helpful for generating field trip and site visit reports. It organizes all the sketches, notes, and photographs taken during the visit, automatically, and produces a report which can be made into PDF format, modified, and shared with colleagues or clients.

Download from: [iTunes](#), [Google](#)

## 12. Pixlr Express

It is a photo-editing app developed by Autodesk. It makes it possible to enhance the quality of architectural images through the use of masks and overlays, among a wide variety of options, not available on other free photo-editing apps.

Download from: [iTunes](#), [Google](#)

### • **Recommended paid apps for architects:**

#### 1. SketchUp Mobile Viewer

The viewing app is used for 3D SketchUp models. It provides measurement tools, dimensions, as well as, section and plans views. It can be used to download 3D models from SketchUp's Warehouse to the smartphone.

Download from: [Google](#)

#### 2. Sun Seeker

This app helps architects to decide on the right orientation for their buildings by providing data like the solar path, the winter and summer solstice paths, and sunrise and sunset times.

Download from: [iTunes](#).

## 10 Mobile Apps you Should never miss, If you are an Architect

<http://www.arch2o.com/10-mobile-apps-that-every-architect-must-have-in-2015/>

In the last years, smartphones has became one of the most useful and essential tools people use to organize their activities. Companies have developed a lot of apps to help people to do activities of many disciplines, and architecture could not be ignored. With the boom in the application designing industry and the competition amongst them, the quality has improved over the past couple of years. There are a lot of apps for architects, and we will review the top ten applications you must have. Here is a list of the best 10 apps that every architect must have.

### 1- Graphisoft's BIMx app. (iOS and Android)

On the top of our list comes [BIMx](#), which is the ideal app for architects using the ArchiCAD program to present or share designs with clients and contractors. The app integrates 2D and 3D for BIM models, see the floor plans, helping you to better understand the designs. BIMx models can be shared in real time — so clients can access individual BIMx Hyper-models (including 2D and 3D content) on any of their devices after their architect shares it with them. This app can be the most useful tool in the construction process.

**Price:** Free ([iOS/Android](#)), BIMx PRO: 49.99\$

### 2- Autodesk Formit (iOS and Android)

You can now create models on your phones or tablets. You can create conceptual models quickly anywhere and anytime, or even you can create and edit BIM models in your mobile device. Added to this the application was recently updated with the real-world site information and the location-aware Shadow Study tool with which you just shouldn't feel afraid to explore. You can even import the site image from the satellite. If you are not satisfied with the quality of your models made in a mobile device, you can export them later and edit them in your computer to improve them. And how can I forget you can back it up on cloud and share it with others just with a tap.

**Price:** Free ([iOS](#), [Android](#))



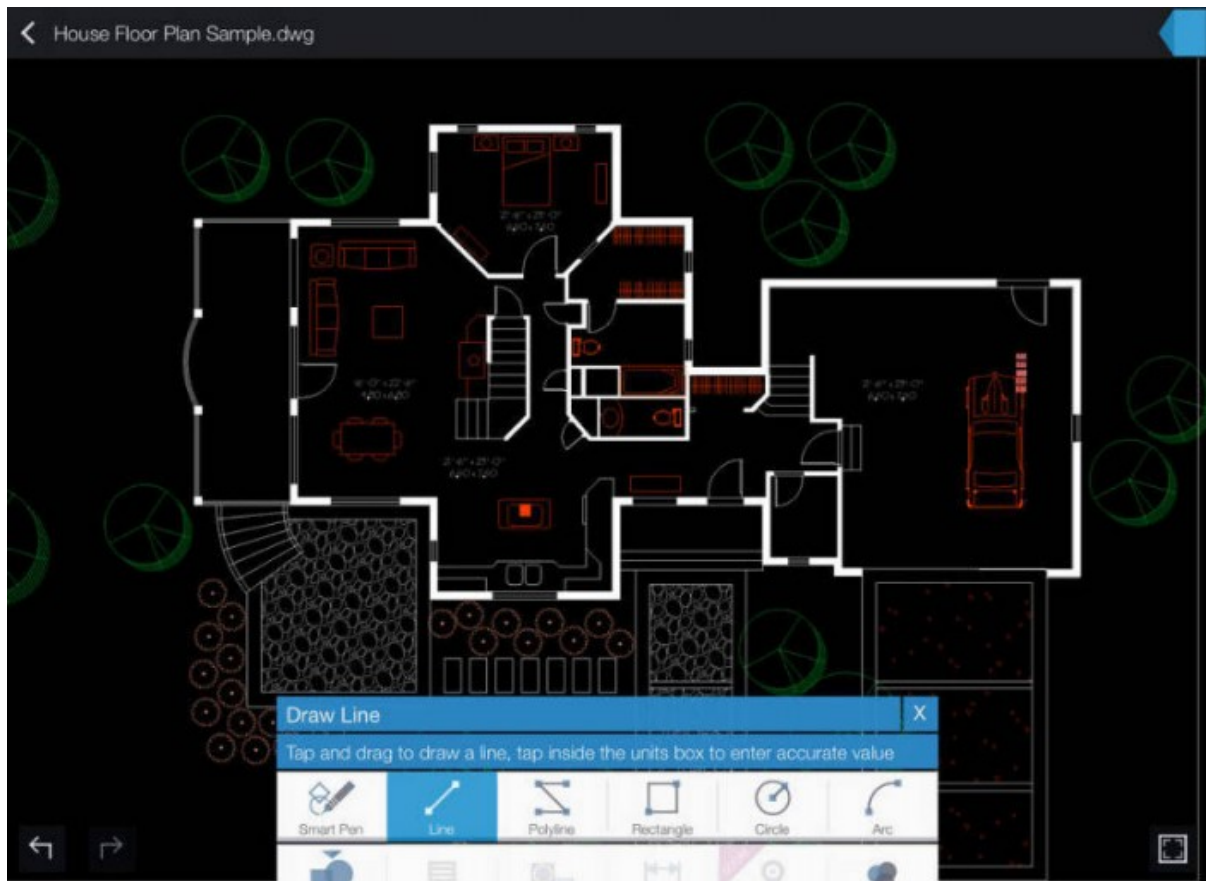
### 3- Paper (iOS only)

Having won Apple's *App of the Year* and been given the 2012 *Apple Design Award*, [the Paper app by FiftyThree, Inc.](#) makes it easy to capture your ideas as sketches, diagrams, illustrations or notes and share them on the internet. It's a simple and intuitive app built specifically for the iPad's display. The company recently announced the introduction of a 'pencil' stylus that connects to the iPad via Bluetooth. Price: Free ([iOS](#))

### 4- Autocad 360

Developed by Autodesk, Autocad 360 is an extremely fundamental app that needs to be installed on your phone or tablet so that you have access to all the drawings when you are on the go. Autocad 360 enables you to view, create or edit any drawings. It will help you to access drawings anytime and anywhere you need to, and you can also share them using your web browser.

Price: Free ([IOS](#) , [Android](#))



5-

**MagicPlan**

This is a very interesting and useful app. It uses the device's camera to draw the floor plans of real spaces. You just have to stand in a certain place and point your device, and the app will draw the floor plan. When it is done, you can export the floor plan as a PDF, DXF or a JPG.

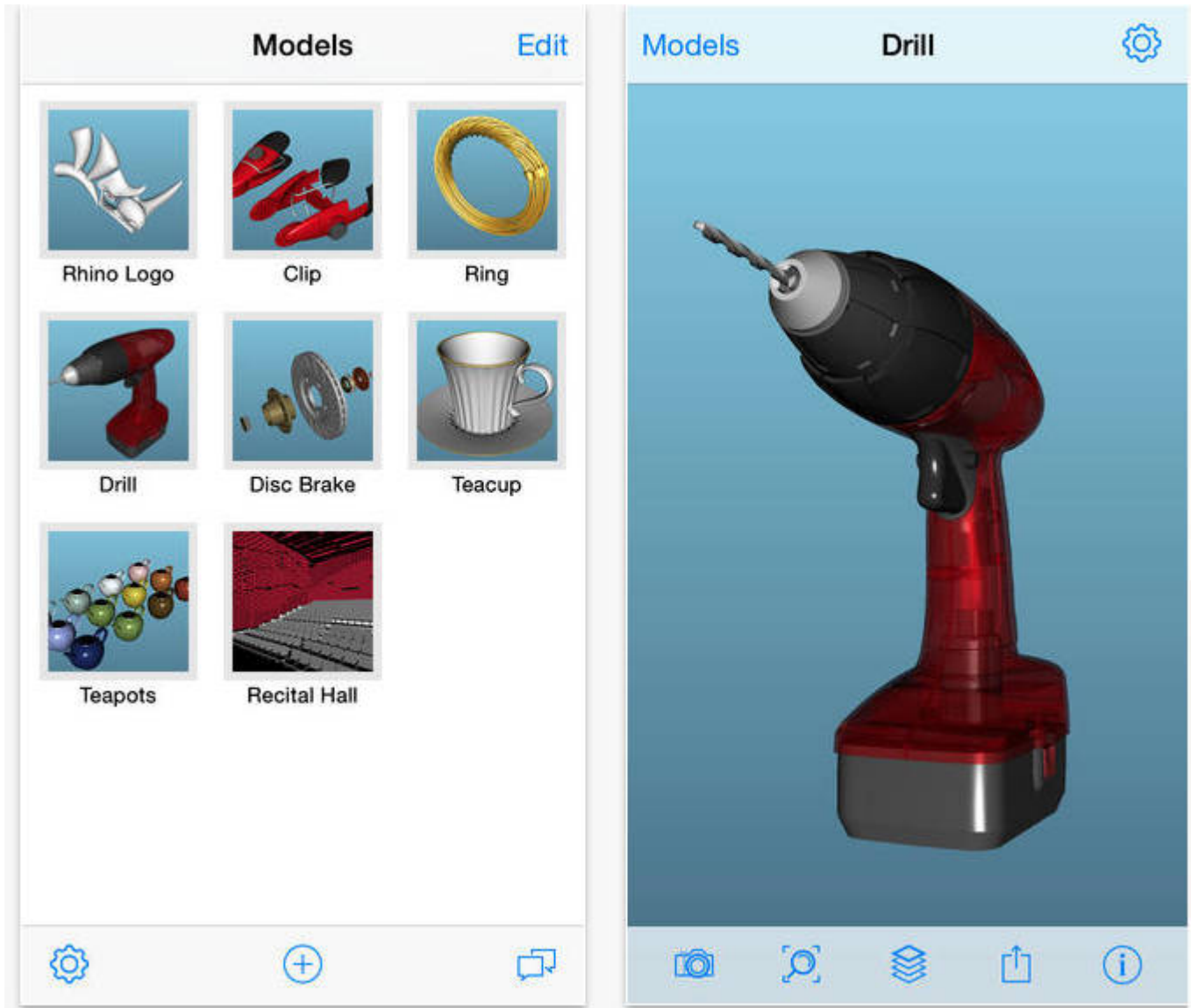
**Price:** Free ([iOS](#) , [Android](#))

6-

**iRhino****3D (iOS****only)**

This app will provide you the opportunity to view any Rhino 3DM file on your mobile device. It is useful to showcase your models when you do not have your laptop easy-to-hand.

**Price:** 3.99\$ ([iOS](#))



## 7- SketchBook (iOS, Android)

It is an application owned by Autodesk. This application is very helpful to draw sketches. You can also draw in a picture to see the way your designs would look. And finally, if it is difficult for you to draw in perspective, this app gives you guides to do it well. We architecture students and architects can be inspired anywhere anytime by anything. Literally! The epiphany might descend upon us in the most crucial areas. In situations like these, instead of scavenging for a paper and a pencil, in this time you might even miss the opportunity, this application comes in handy. This application is perfect for digital sketching.

**Price:** Free ([iOS](#), [Android](#), [Amazon](#), [Windows](#))

## 8- Morpholio Trace (iOS)

The more you draw the better it is. I personally love working in layers! The more layers you have the more refined the design turns out to be. This application is

perfect for this, you keep sketching over your sketches. Adding layers over layers just like one places tracing paper. It's truly the perfect application for an architect.

**Price:** Free ([iOS](#))

### 9- CADTOUCH (iOS, Android)

The last minute editing is what we all do to our work. There is some tiny little fault that we find in our drawings and we need to edit them. It is PRO CAD editor and viewer that helps you completely reinvent the on-site drawings and gives the user the power and ability to edit, measure, annotate, draw and view their work on-site. It also helps you to calculate the area of any space, design and draw floor plans and make a diagram. When you finished your work, you can email the archive immediately, so this app is very useful when you are not in your office.

**Price:** Free ([iOS](#), [Android](#))

### 10- Architect Envi Deluxe (iOS)

When bored a little bit of historical and current information seems to be the most entertaining time-pass. It's like having all the maestros and the legends in your pocket at all times. The app is also perfect for architecture students. It will provide you information of the great architectural works in all-history and the most important architects. You can browse across every century and find the most famous buildings of each one. It's sorted out according to the time-period with pictures of works of over 100+ architects. It also provides you information of the great architectural works in all-history. You can browse across every century and find the most famous buildings of each one. Apart from the pictures this also gives one access to 'in-depth' information about the architects. It lets you add and save photos and add even more images of your own to the collection.

**Price:** 3.99\$ ([iOS](#))



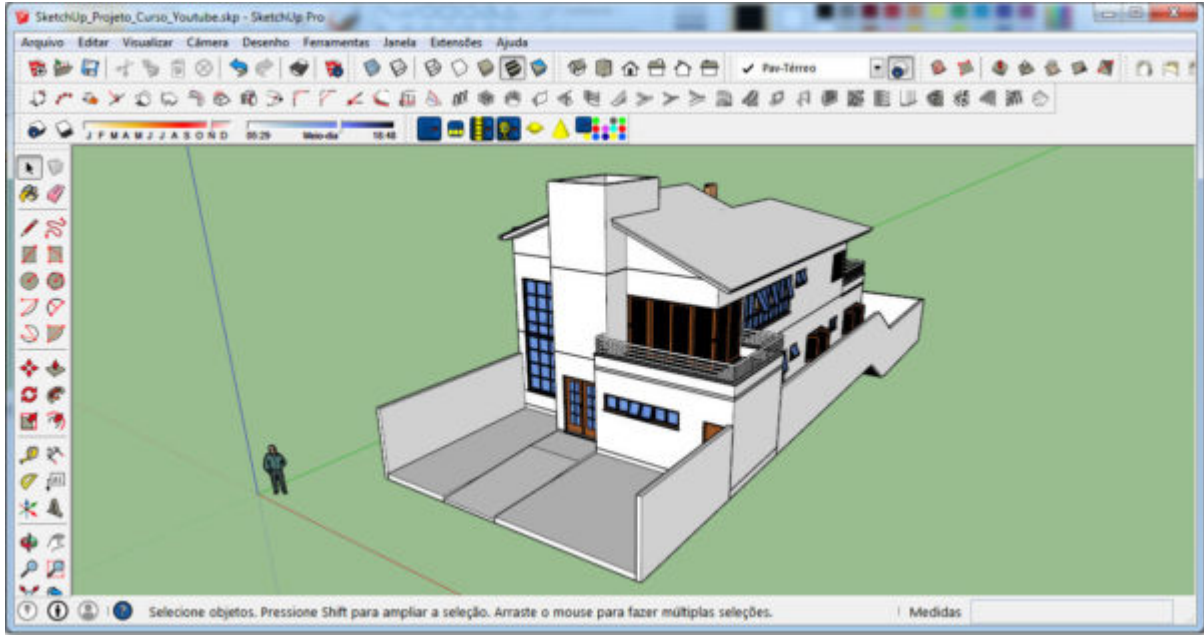
## 8 Architecture Software that every Architect should learn

<http://www.arch2o.com/8-architecture-software-every-architect-learn/>

8 Architecture Software that every Architect should learn  
 Drawings remain the primary means by which architects communicate their ideas to clients, craftsmen or within the design team. The way we create those drawings has evolved over time and is still evolving on a daily basis. Each software is targetted at different needs, and choosing the best one for you depends on many factors such as cost, compatibility with other programs and the amount of time you are willing to spend on the drawing process. Although you will only find the most suitable software by being able to adapt and jump between them, here is a list of basic programs to increase your workflow and help you get from the first draft to the final presentation.



## 1. SketchUp

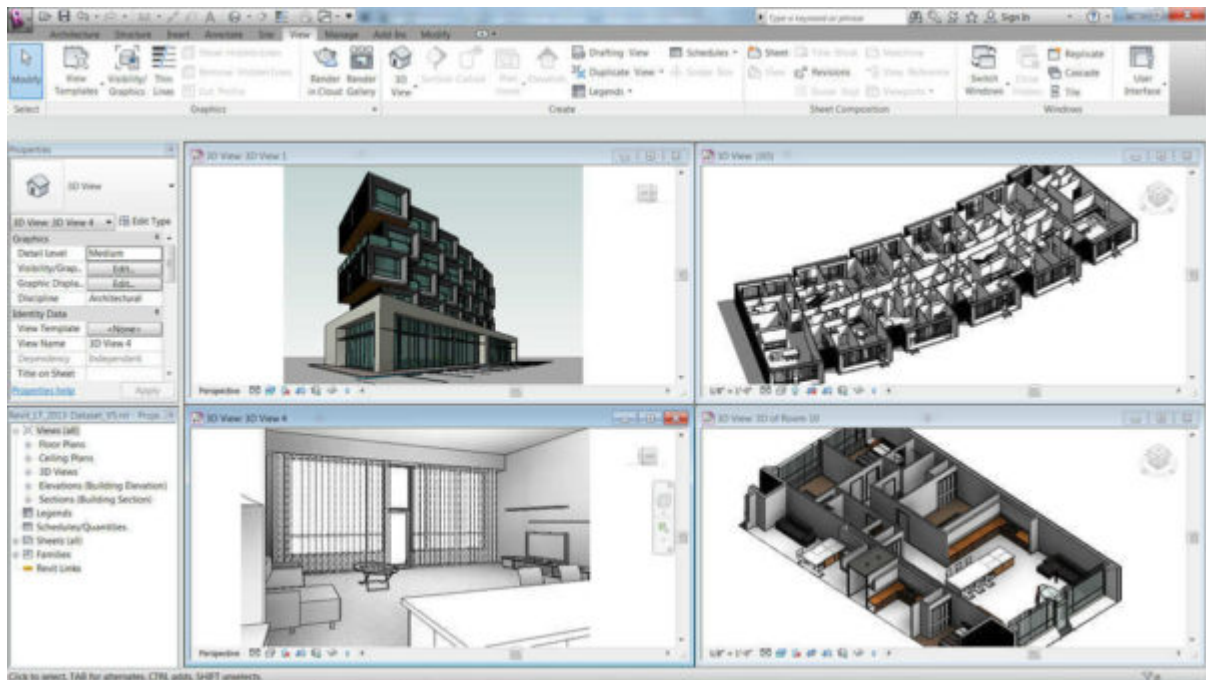


### SketchUp

We strongly believe that architects should start the conceptual phase in 3D. SketchUp allows the user to quickly and easily make 3D designs. It can be downloaded for free however many of its export features are disabled. Since Google bought its copyrights it has become extremely popular in terms of usability and cost. It is one of the easiest programs to understand but its simplicity also means that it has limited rendering capabilities. However, it is still a powerful program to convey first ideas and it also offers an enormous component library, particularly for domestic architecture. Every object, surface, and material come with its own unique texture, which is definitely a plus. Its biggest pro remains till date its user-friendly interface.

Read more: [SketchUp Tutorials for Architects: The Most Useful Web Sites and Resources](#)

## 2. Revit



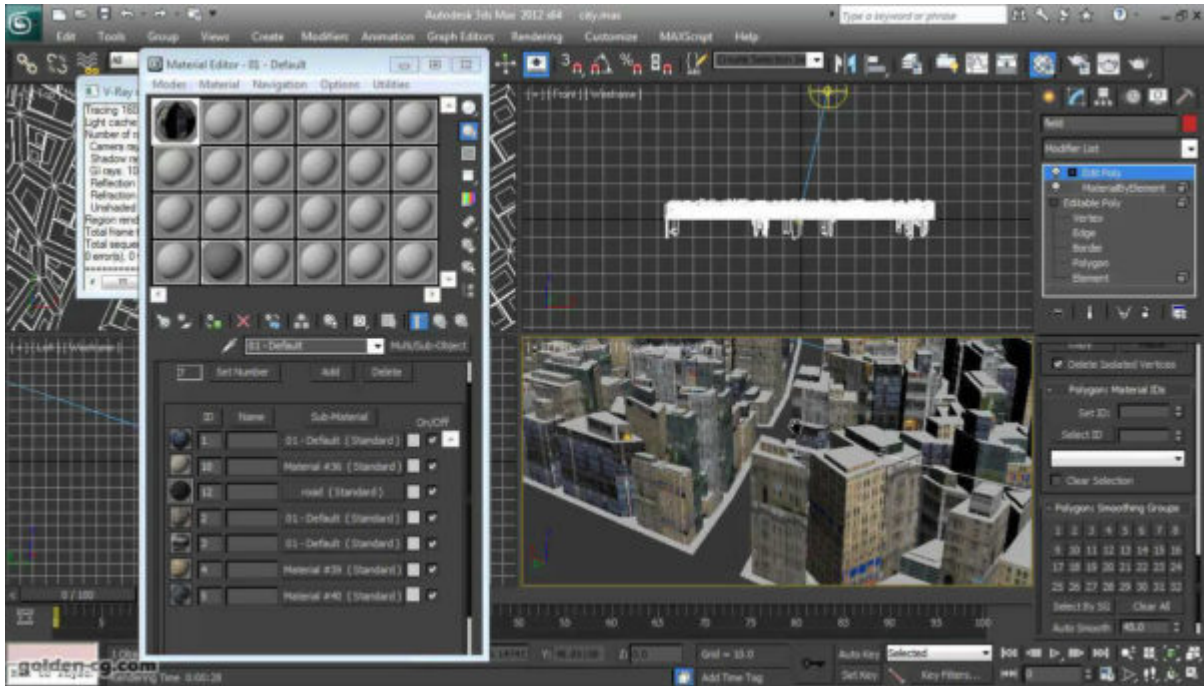
### Revit

Revit is the all-in-one software for 2D and 3D projects, that produces a total project output including modeling, rendering, and 2D construction documents. Instead of lines and circles, you can use actual walls, roofs, beams, columns and other building components and also real-world characteristics of the physical building such as windows and doors. It is compatible with AutoCAD, so it is pretty easy to insert a DWG file and use it as a trace reference to start shaping your model. One of its biggest advantages is that every change you make to the model is updated in all views, including plans and elevations. This reduces coordination and drawing time significantly.

Read more:

[Revit for Architects: 21 Sites to Download Revit Families for Free](#)  
[Why switch to BIM](#)

### 3. 3D Studio Max



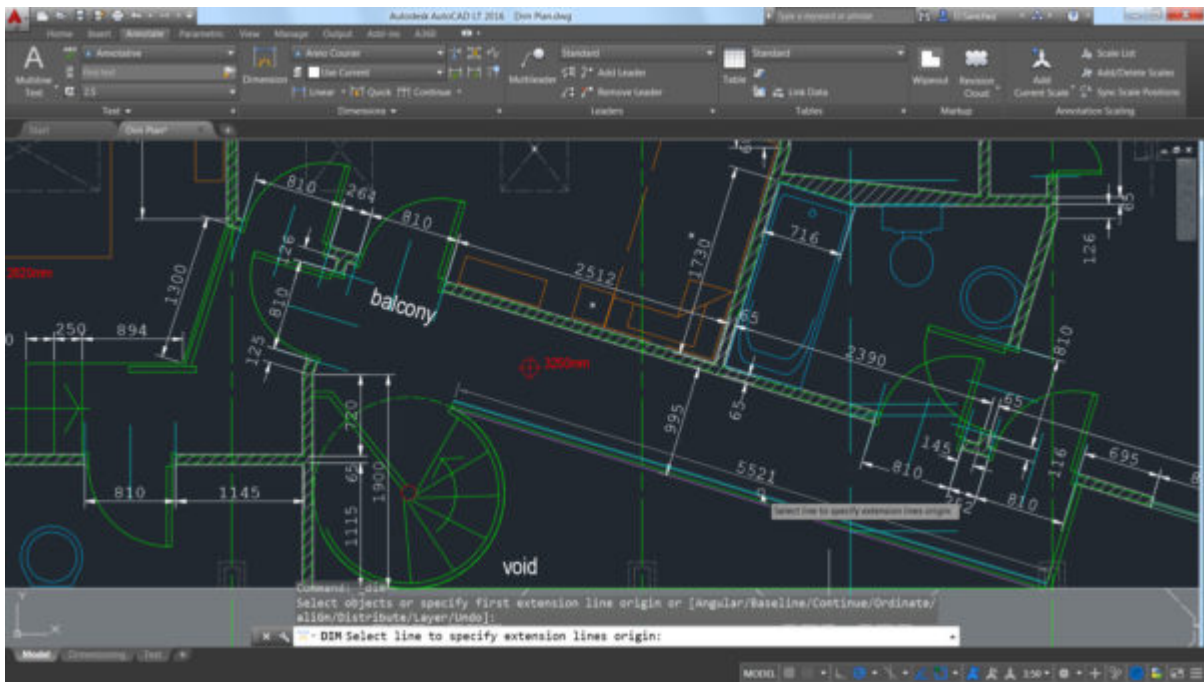
#### 3D Studio Max

Although 3DRhino is getting spread at an exponential rate, because of its parametric plugins and smooth modeling features. Yet, 3D Studio Max still the most popular software in the 3D market. Since those primordial days of computer graphics and 3D Studio (software that was running under DOS), things have changed. In just the last half decade 3D Studio Max tools have found their way into far more areas of our work life than anyone would have imagined. It has modeling capabilities and a flexible plugin architecture and can be used on the Microsoft Windows platform. It is frequently used by video game developers, many TV commercial studios, and architectural visualization studios.

Read more:

[Architectural Rendering software: Most Helpful 2D and 3D Web Resources](#)  
[10 Parametric Plugins Every Architect Should Know! \(3D Rhino\)](#)

## 4. Autocad



### AutoCAD

Actually, we don't recommend using Autocad anymore since Revit is rapidly replacing it in the market. Yet, Autocad is the old dominant player in the architecture software industry. It is so well known among students and professionals that it is unlikely to face any compatibility issues while transferring files throughout the design process. It produces purely representational drawings and usually is the stepping stone to 3D modeling software. If you adjust the user interface to your preferences and start experimenting with layers and line weights, you will get a decent draft with standard drawing conventions and measurable construction details. Another version of AutoCAD that is created especially for architects, is AutoCAD Architecture. It has features that allow architects to do a more efficient drafting, creating designs and documents familiar to them. It has the same platform as AutoCAD that makes it easier for experienced architects to understand.

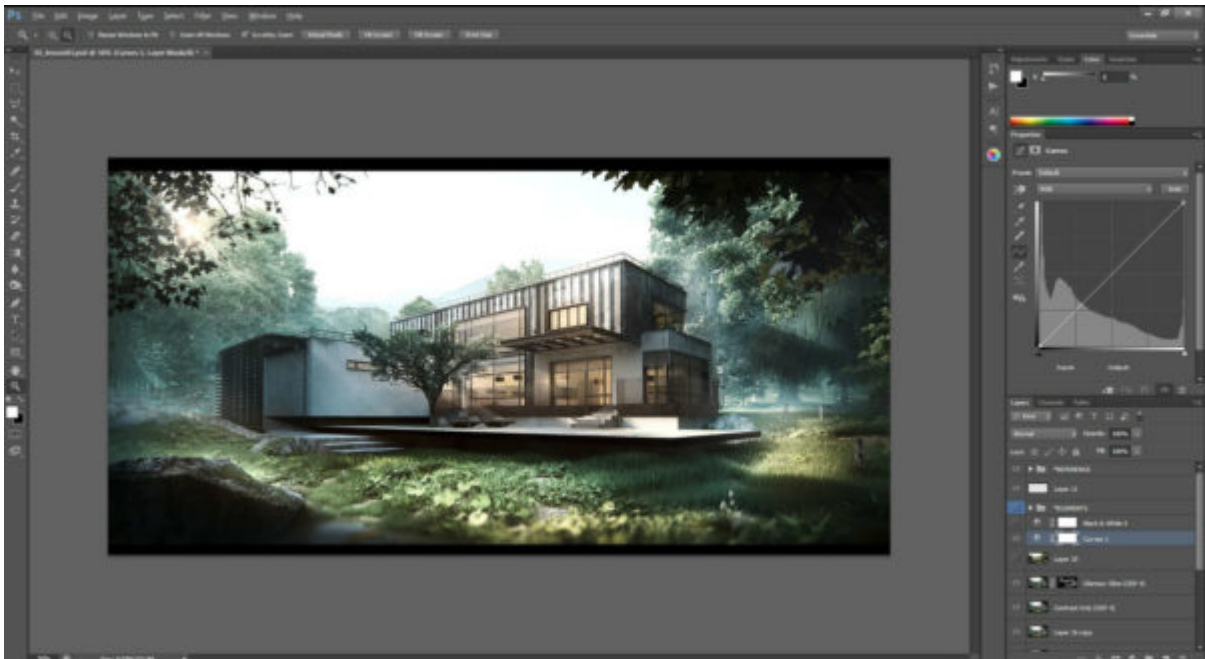
## 5. V-Ray



### V-Ray

V-Ray is simply the best for realistic visualization. It is a plug-in that turns SketchUp and ArchiCAD into a nice rendering. The cleanest textures, darkest darks and brightest whites amount to the most accurate representation of real-world conditions. If your aim is to put your clients in the spaces you are designing in convincing style, V-Ray is going to be your best option. Its extensive material library and resources provide a variety of options in lights, surfaces, and realistic textures to take your architecture design to the next level.

## 6. Photoshop

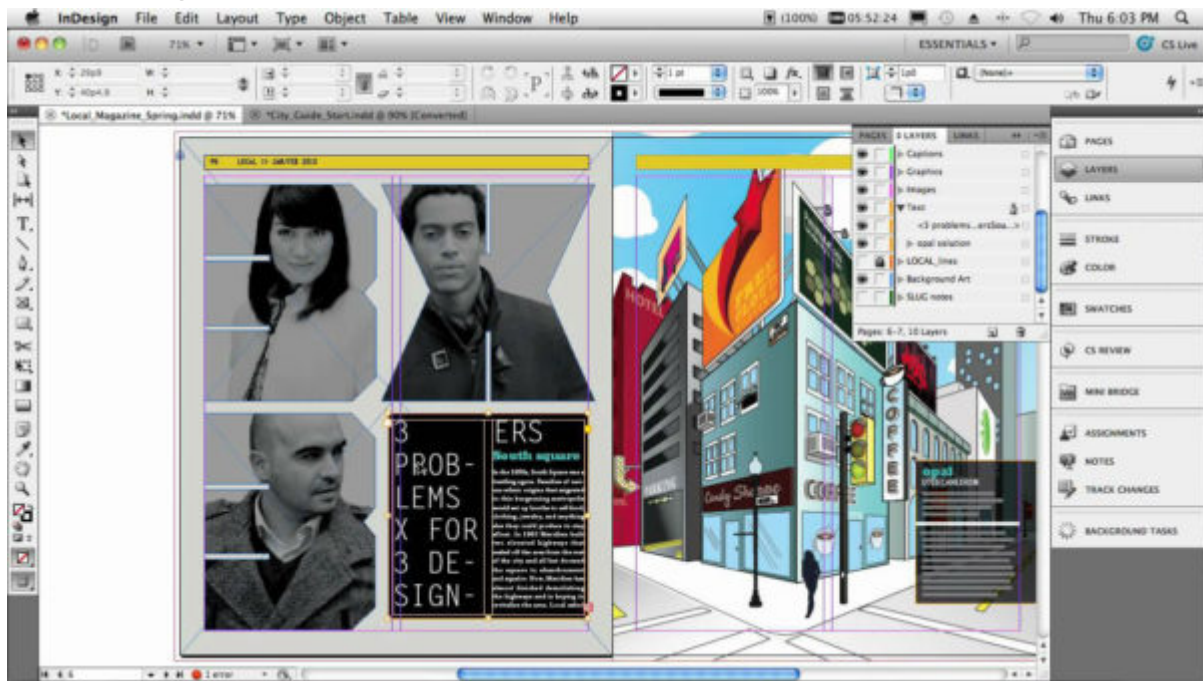


## Photoshop

When creating renderings, whether it is a section, elevation or plan, knowing how to use Photoshop is absolutely vital. It is a high-quality image producing software, perfect for final renderings and touch-ups. With its familiar system of layers, you can give to your rendering the atmosphere and style you want with very few alterations. It is used for image processing, adding textures, landscape, people, a sky, etc. It is also a great way to fix and edit scans of your work and create vignettes for the final presentation.

Read more: [Photoshop Architectural Rendering: 10 Websites you should visit weekly](#)

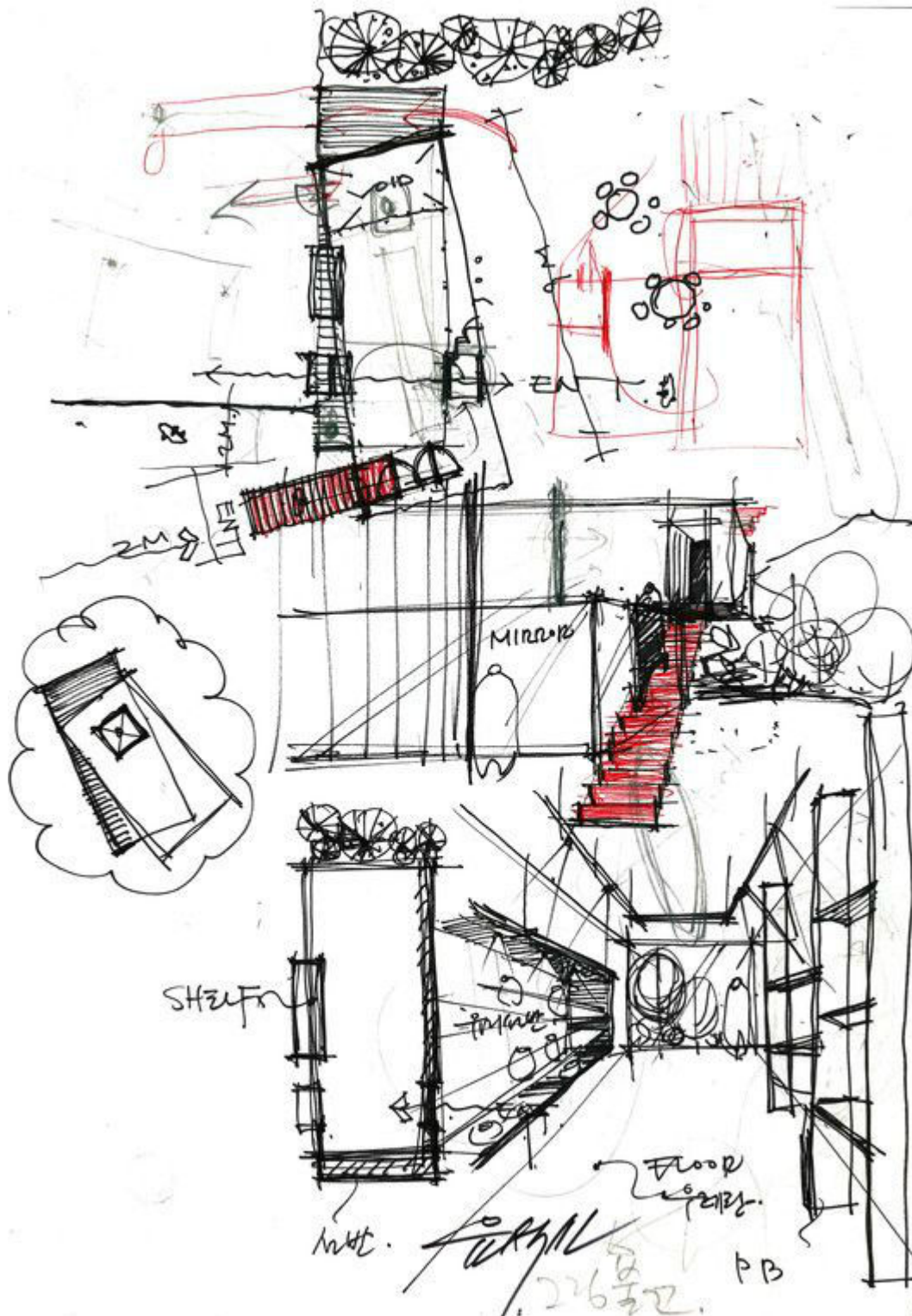
## 7. In Design



### In Design

In Design is basically a layout program suitable for creating from booklets to large presentation sheets. You can arrange objects into presentable forms including text, shapes, and images and is also good for document creation, such as resumes and portfolios. You can set up font types/sizes, page master pages with page numbers, helping increase productivity and document consistency. The software also gives you the ability to package your files together and bring them with you so you can work at school or at home without the hassle making sure you copy each separate file and take it with you.

## 8. Hand Drawing

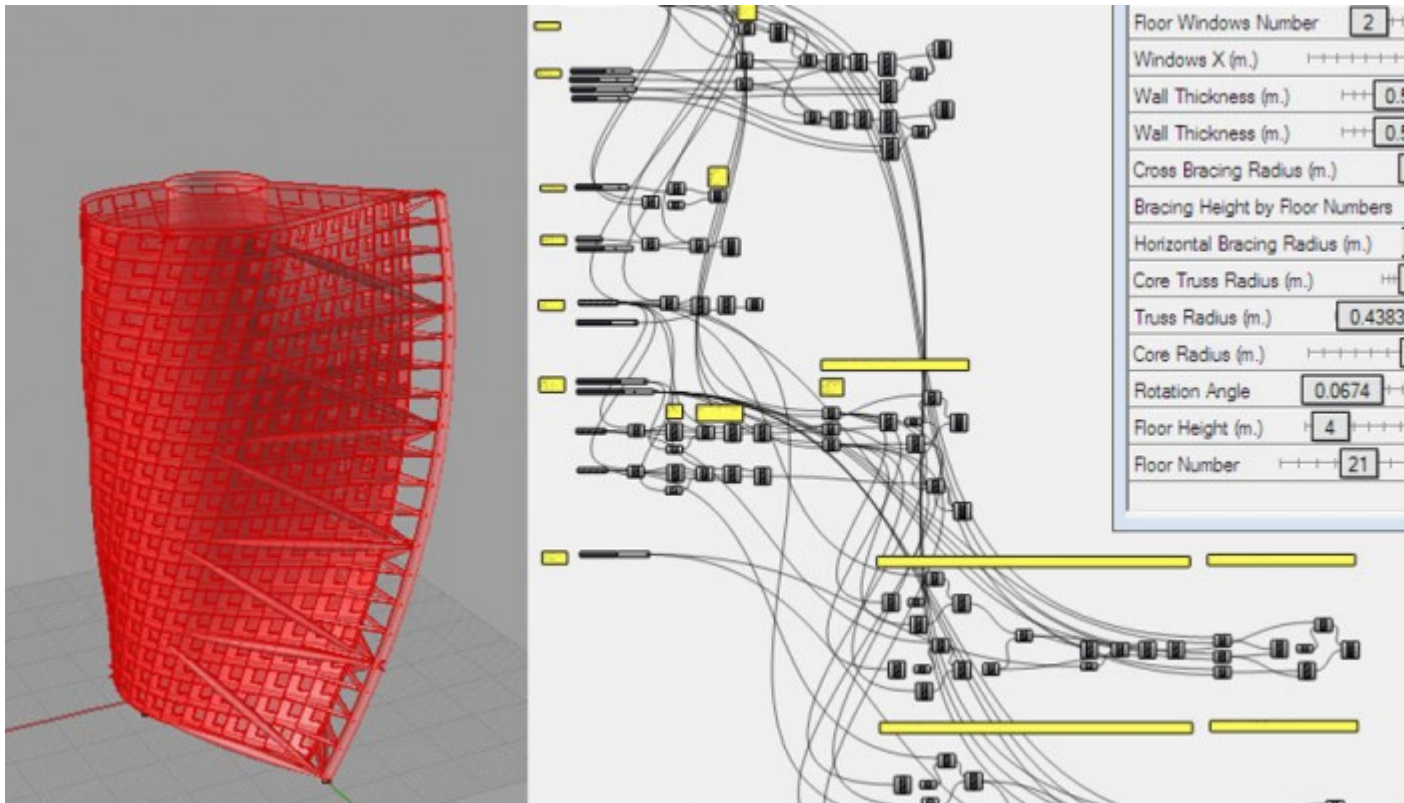


Courtesy of Jun Gil – Young

The one thing you should always remember is that drafting and design software is just a tool in the hands of architects to facilitate the workflow and reduce the valuable time of drawing production. Architects draw and sketch. There is no more basic and valuable skill, even in our technologically advanced world than hand sketching. The initial idea should be clear and

concise and easily communicated to colleagues and clients. A simple sketch can say a lot more about your concept than the best and most detailed rendering. After all, pencils don't require any updates.





## 10 Parametric Plugins Every Architect Should Know !

<http://www.arch2o.com/10-parametric-plugins-every-architect-should-know/>

As we enter a new emerging era in the field of contemporary architecture and design, there is a tremendous demand for highly customizable convoluted geometry playing vital roles in the overall form, shape and size of the buildings. The direct outcome of such an increasingly persistent requirement for “modern” & “futuristic” forms, has paved the way for innovative new techniques and tools for today’s architect – Computer Aided Design (CAD). It deals with the use of computing devices to abet +one’s odds of better perceiving and visualizing a design. It is generally used to create, analyze, modify and finally present the design, due to the accuracy and quality, it is capable of consistently administering. Parametric design on the other hand refers to the use of parameters such as constraints, the relationships between geometric entities, dimensions, the shape and size of the entities, etc. These parameters are substantially responsible in determining the relationship in between the design intent and the design response and overall, to algorithmically generate the desired framework and form of the model, which is to be visualized.



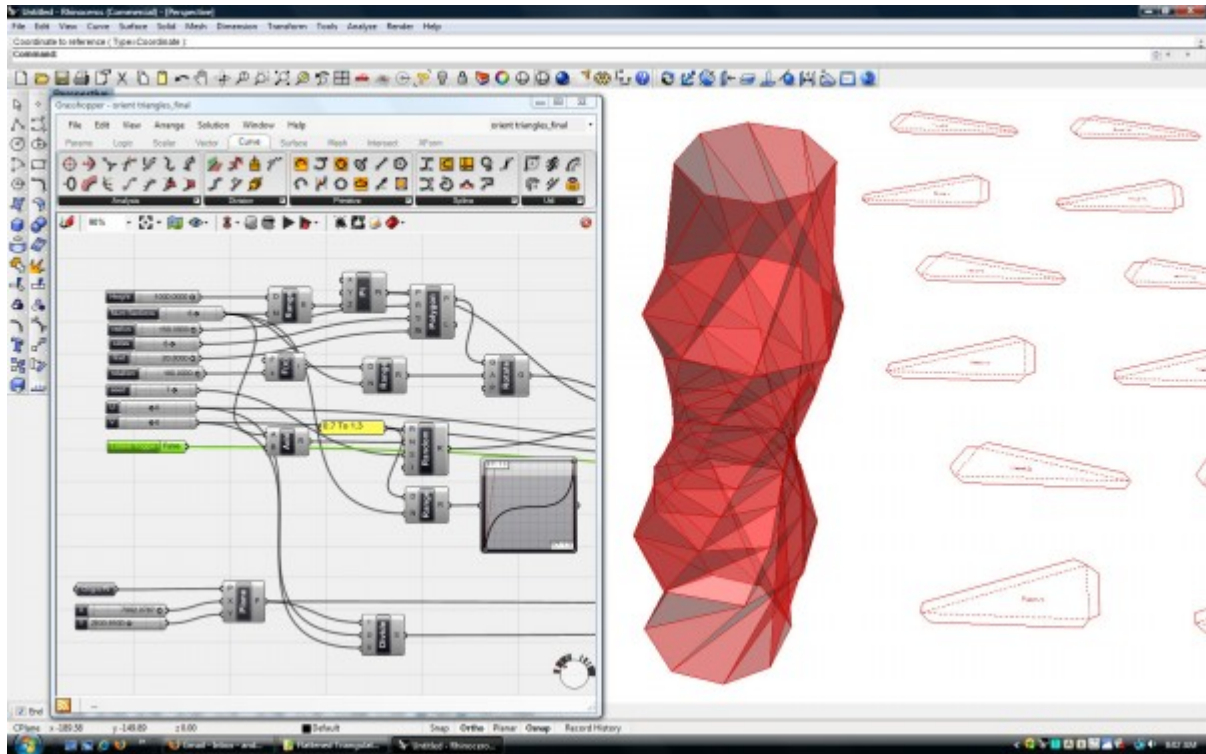
Courtesy of Zaha Hadid

## 10 Parametric Plugins You Should Know !

The challenge of visualizing complex forms has been met with the emergence of parametric CAD plugins and software. Parametric design is by far one of the most widely used modeling processes today, for efficiently generating a wide array of similar yet complex geometrical patterns within record breaking time constraints. Some parametric plugins (for a 3D modelling tool called Rhinoceros) used actively today include Grasshopper 3D, Ladybug, Honeybee, Geco, Kangaroo Physics, Karamba, BullAnt, Hummingbird, Heliotrope-Solar, Mantis, among many others. As Rhinoceros/Grasshopper are open source, third party developers actively develop a multitude of free plugins and add-ons for them. Let's briefly review each of them[7].

### 1. Grasshopper 3D

Grasshopper 3D is a graphical parametric form generating tool, integrated into Rhinoceros 3D. It requires no prior knowledge of programming and scripting and still allows the architects & designers to generate complex parametric forms. The dimensions of the form are subjected to constraints and can easily be altered by sliding the various parametric sliders in the Grasshopper model space[2,7].

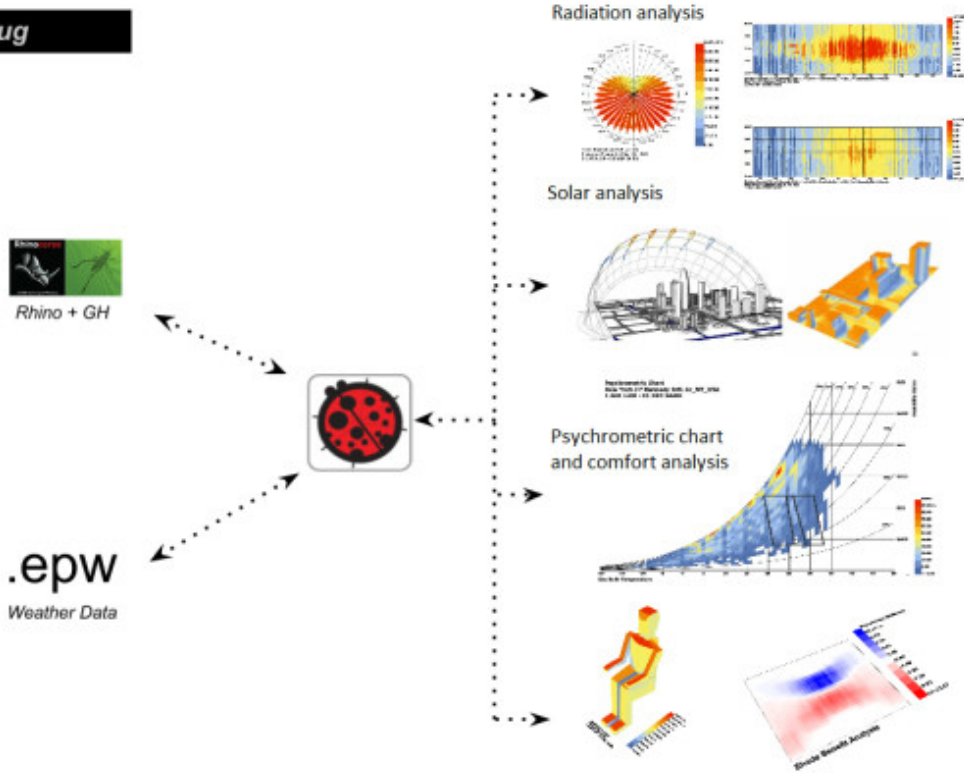


Courtesy of Seth Moczydlowski

## 2. Ladybug (Environmental analysis)

An open source parametric plugin called “Ladybug” is used to support further environmental analysis inside the Rhinoceros/Grasshopper Interface. Ladybug imports standard “Energy Plus Weather” files (.EPW) into Grasshopper 3D and brings with it, a wide variety of 2D and 3D interactive graphics to conduct accurate environmental studies for the form generation of the building. It simplifies the process of analysis and automates the calculations, whilst providing easy to understand graphical visualizations in the 3D modeling interface of Grasshopper. It further allows users to work with validated energy and daylighting engines such as “EnergyPlus”, “Radiance” and “Daysim”, effectively allowing to the architect to make better design choices[1,3,2,8].

Ladybug



Courtesy of Chris Mackey

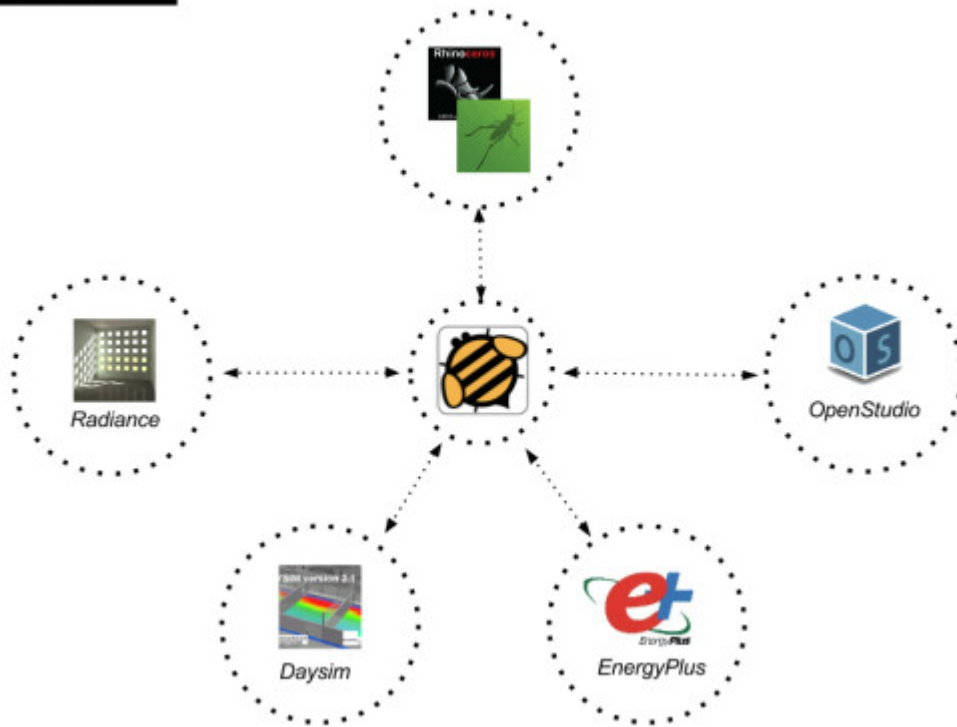


Courtesy of La Masa

### 3. Honeybee (Environmental analysis)

Honeybee is another parametric plugin for Grasshopper which also connects Grasshopper3D to “EnergyPlus”, “Radiance”, “Daysim” and “OpenStudio”, for building energy consumption & daylighting simulation[2,3,4].

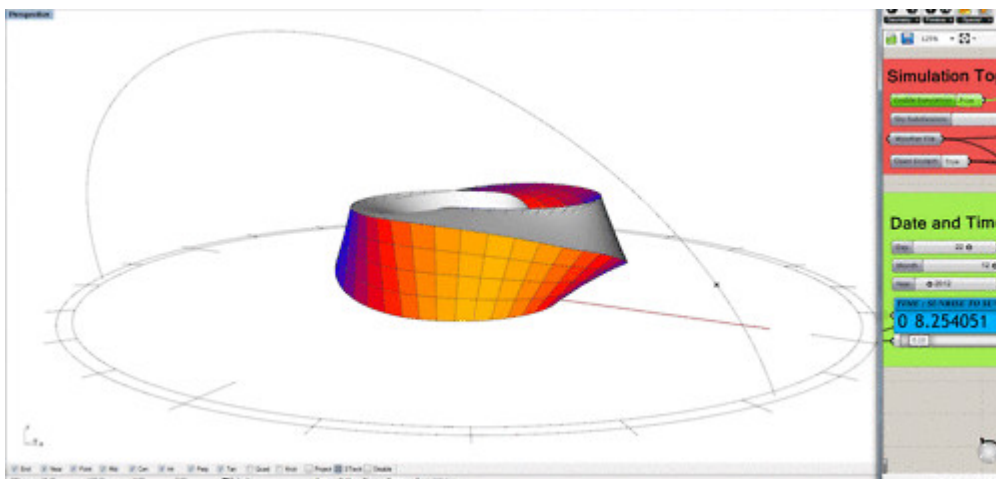
**Honeybee**



Courtesy of  
Chris Mackey

**4. Geco (Environmental analysis)**

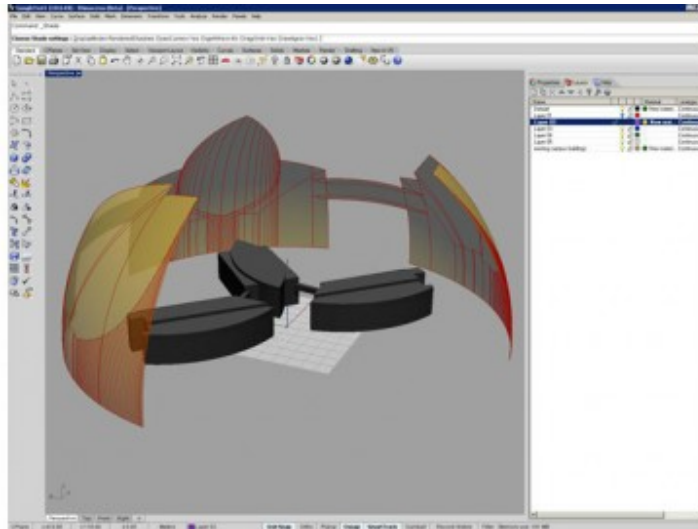
Geco allows one to export and actively collaborate effectively with another software called Ecotect, in order evaluate one's design with various the performance data, which Geco again makes possible to import the results as feedback, back into Grasshopper. Now, Ecotect is a visual software for architects, which enables them to test environmental performance issues and simulate various environment and climatic conditions in order to design more green and efficient parametric structures[4].



Courtesy of Danny

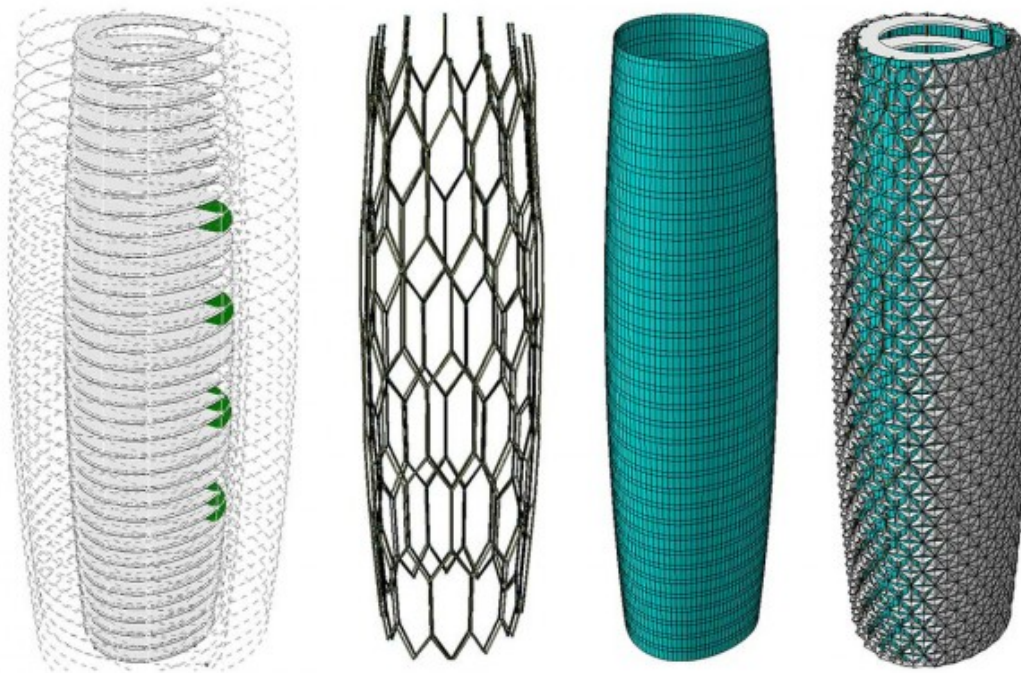
## 5. Heliotrope-Solar (Environmental analysis)

It is a Grasshopper plug-in for manipulating geometry based on the dynamic position of the Sun. The tool calculates the apparent position of the sun (using vector physics) at specified dates and times of the day, and uses this data to compute and provide a variety of components for parametrically manipulating the design based on the position of the sun on those specified dates. It is used to create solar-aware designs, to deduce the position of rendering lights & to design shading devices for the structure[4].



Courtesy of Brian Lockyear

The applications of 'Ladybug', 'Honeybee', 'Geco' & 'Heliotrope-Solar', in the 'Grasshopper 3D' environment, can be extended to generate responsive architecture ([Dynamic Facades](#)), where the building envelopes adapt to natural systems, such as the dynamic movement of the sun. Initially, the building is modeled in Rhino, oriented as it is to be built in the real world, and is subjected to a virtual Sun, which replicates the real life conditions of the Sun. It is then analyzed extensively at different times of the day, with respect to the Sun's path. Next, Grasshopper 3D is used to parametrically generate the required geometry for the structure, to determine the size and orientation of openings and to generate various shading devices and mechanisms, for each panel[3,5,8]. These panels open and close in response to the sun's position and follow its movement throughout the day, in turn bringing in more diffused light, causing less heat gain and glare, and more importantly, cutting the cost on air-conditioning systems, inside the building. Good examples of buildings which have implemented this technology are The Al Bahr Towers (which act as the Abu Dhabi Investment Council Headquarters), designed by Aedas and Arup, and The Arab World Institute, located in Paris, which was designed by Jean Nouvel. The panels act as a heat buffer, and also bring down carbon emissions by reducing the need for air conditioning systems, making the building sustainable, balanced and green.

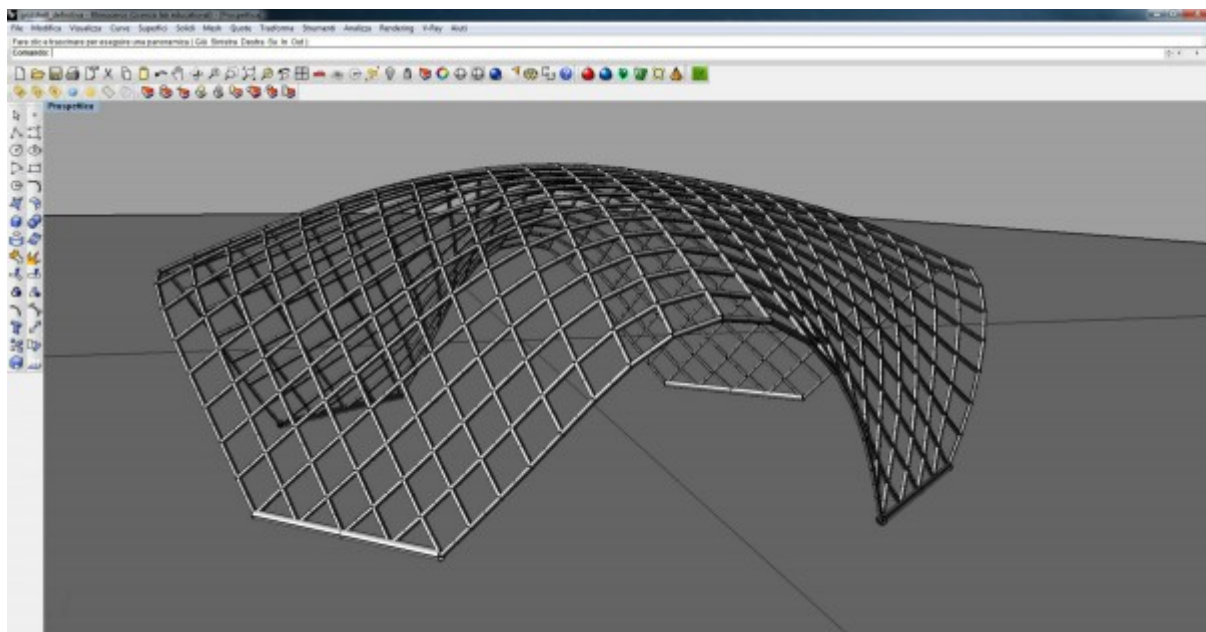
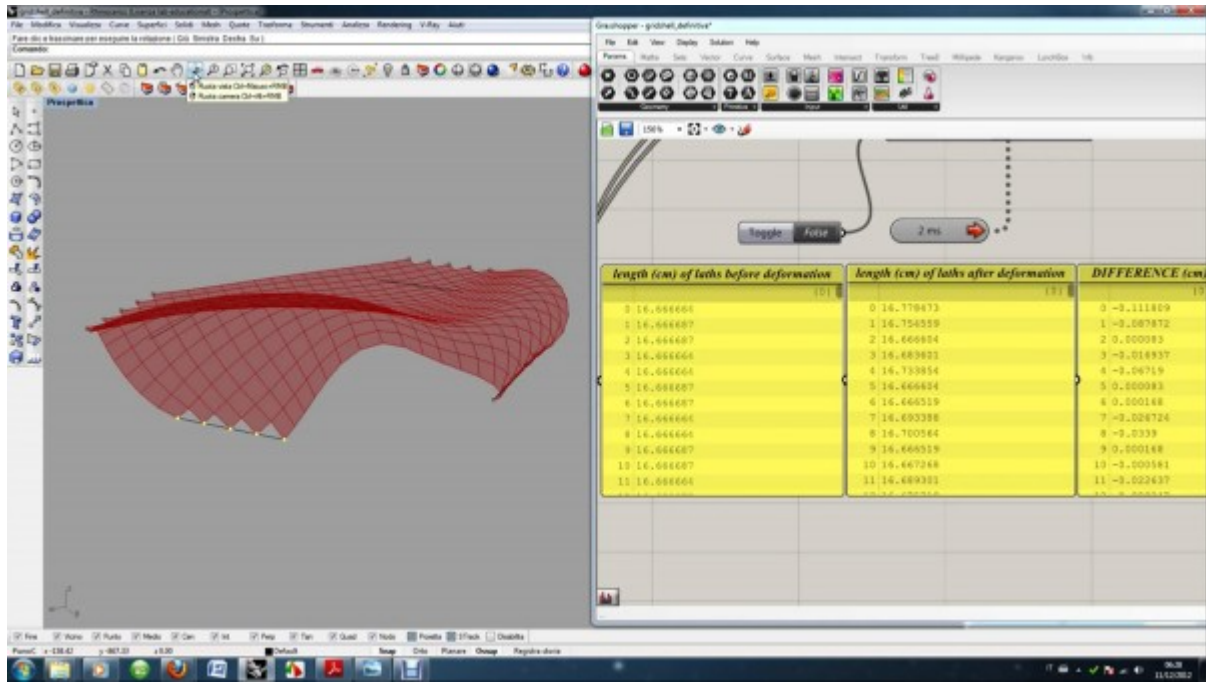


Courtesy of Aedas Architects

These environmental analysis plugins enable architects to build much more balanced, green and sustainable structures, by coming up with various innovations on the facades to leverage the external weather conditions to the maximum. Building envelopes act as interfaces between the natural exterior environment and the controlled interior environment. The variation of form across the façade of a building, is not fabricated at random, but rather is morphed and controlled parametrically, corresponding to the environmental data[3,4].

## 6. Kangaroo Physics (Structural Analysis)

Structural Engineers use the Kangaroo Physics plugin inside Grasshopper for interactive real simulation, generating form, optimization and analysis of structural components and constraint introspection.

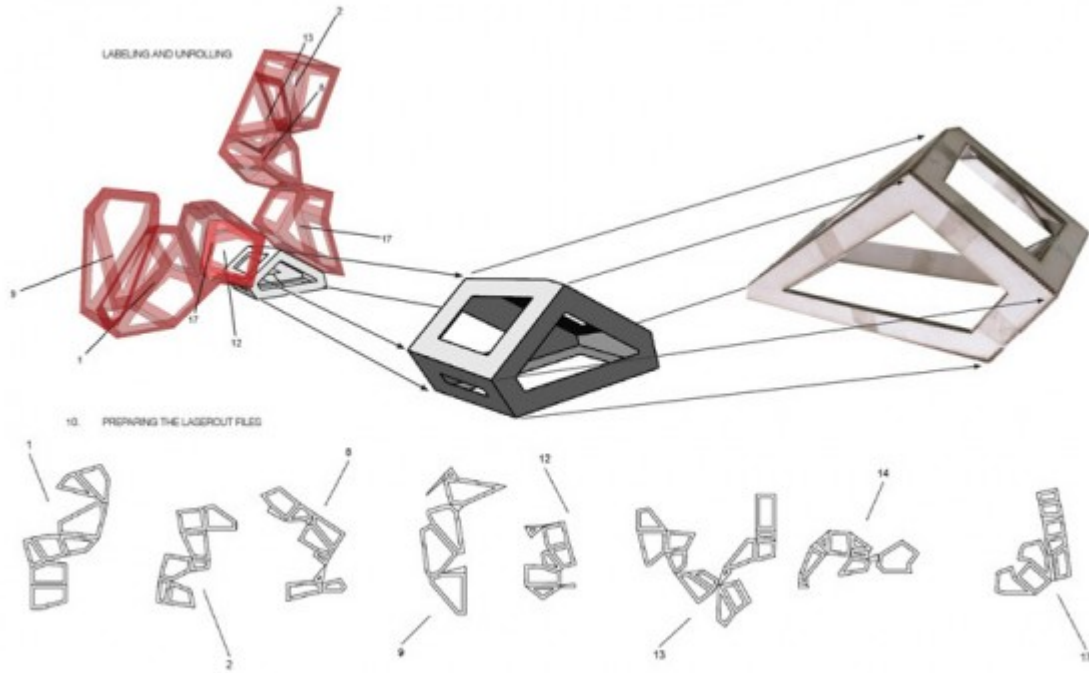


Courtesy of Arturo Tedeschi

## [7. Karamba \(Structural Analysis\)](#)

Parametric design plugins like “Karamba”, define new horizons in the field of structural engineering. Karamba is an interactive structural analysis plugin in the parametric environment of Grasshopper 3D. This plugin makes it extremely simple to combine parameterized complex geometric forms, load calculations, finite element analysis, etc. It provides accurate analysis of spatial trusses, frames and shells at the early design stage. The user is able to create basic ‘pin-jointed’ planar systems, from which graphic statics are generated and analyzed, to understand the available degrees of freedom in these systems, in order to leverage them structurally[7,8].

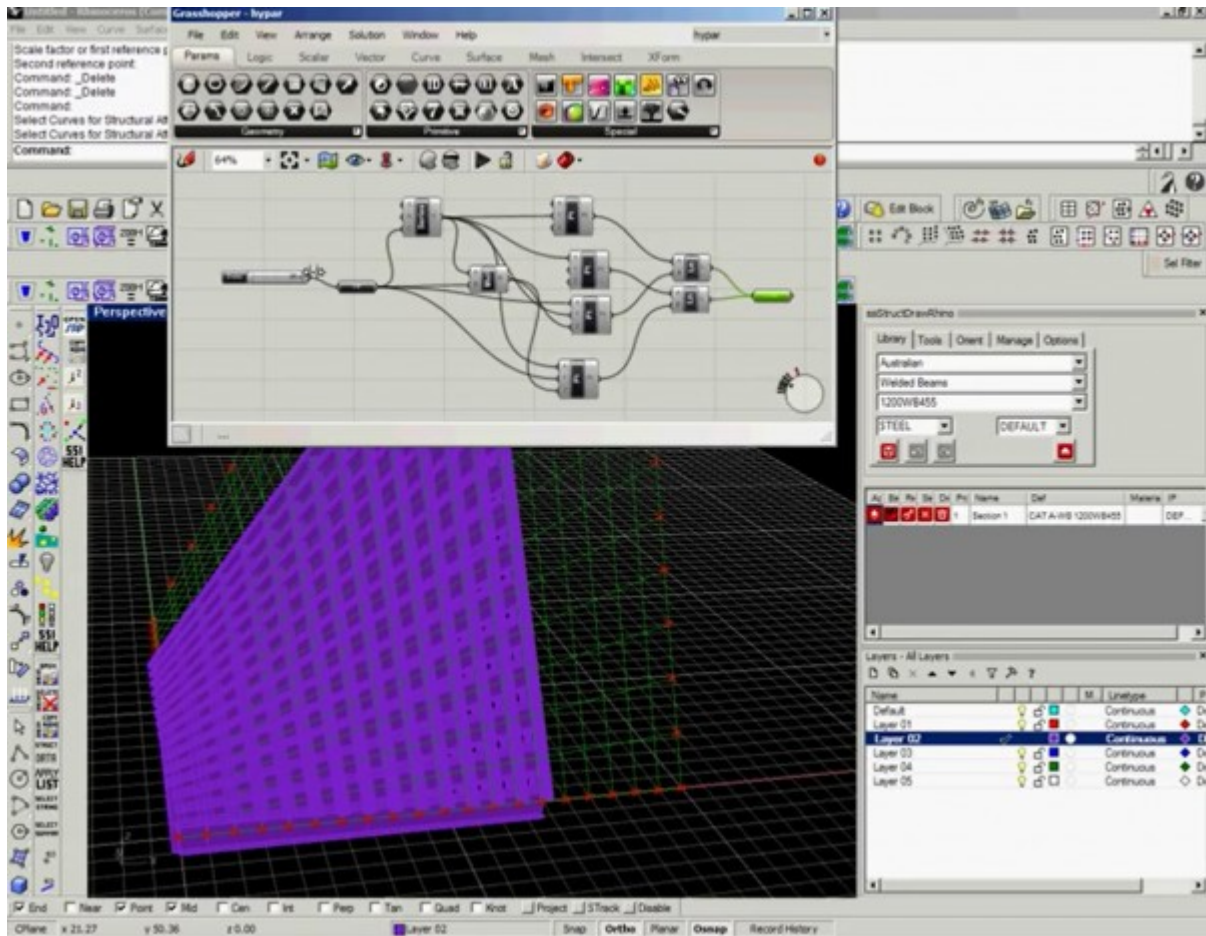




Courtesy of Clemens Preisinger + Jens Böke

### [8. BullAnt \(Structural Analysis\)](#)

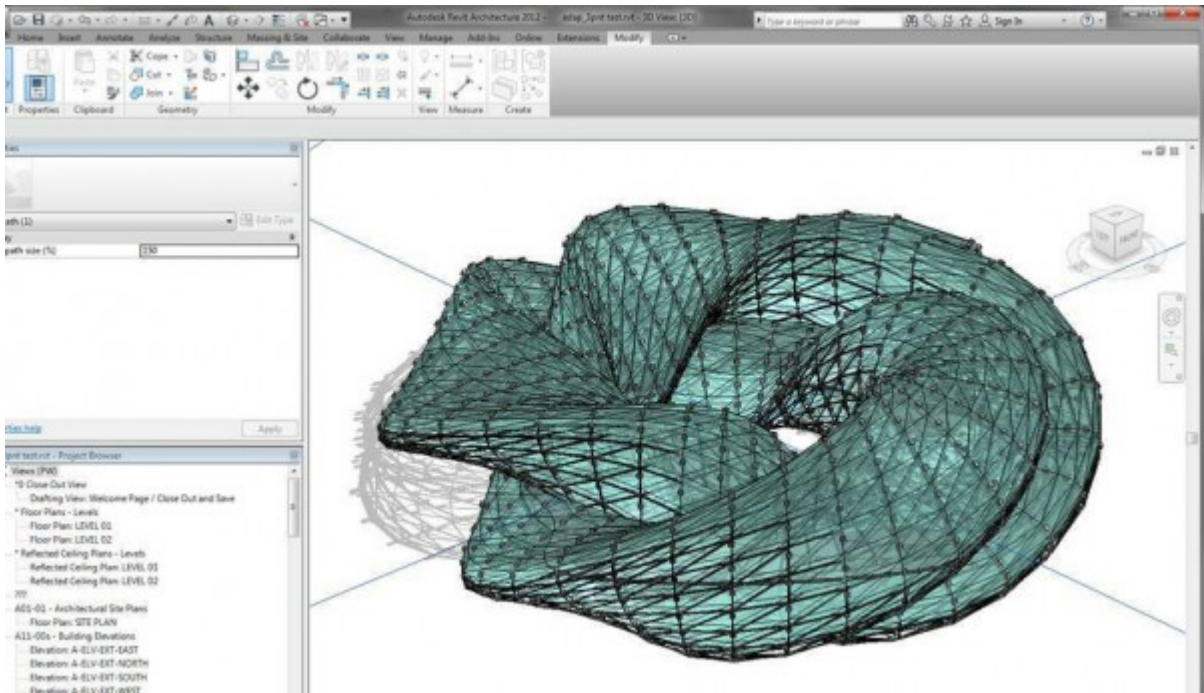
It is a Grasshopper3D plug-in, primarily for Architects and Engineers. It features unique tools which enhance and extend the capabilities of parent program. It features an array of commands including mesh relaxation & inflation, automation in symmetry, tessellation, structural analysis (modeling and sketching) and parametric generation in Grasshopper. It also features geodesic dome & curve network processing.



Courtesy of Jon Mirtschin

## 9. Hummingbird (Structural Analysis)

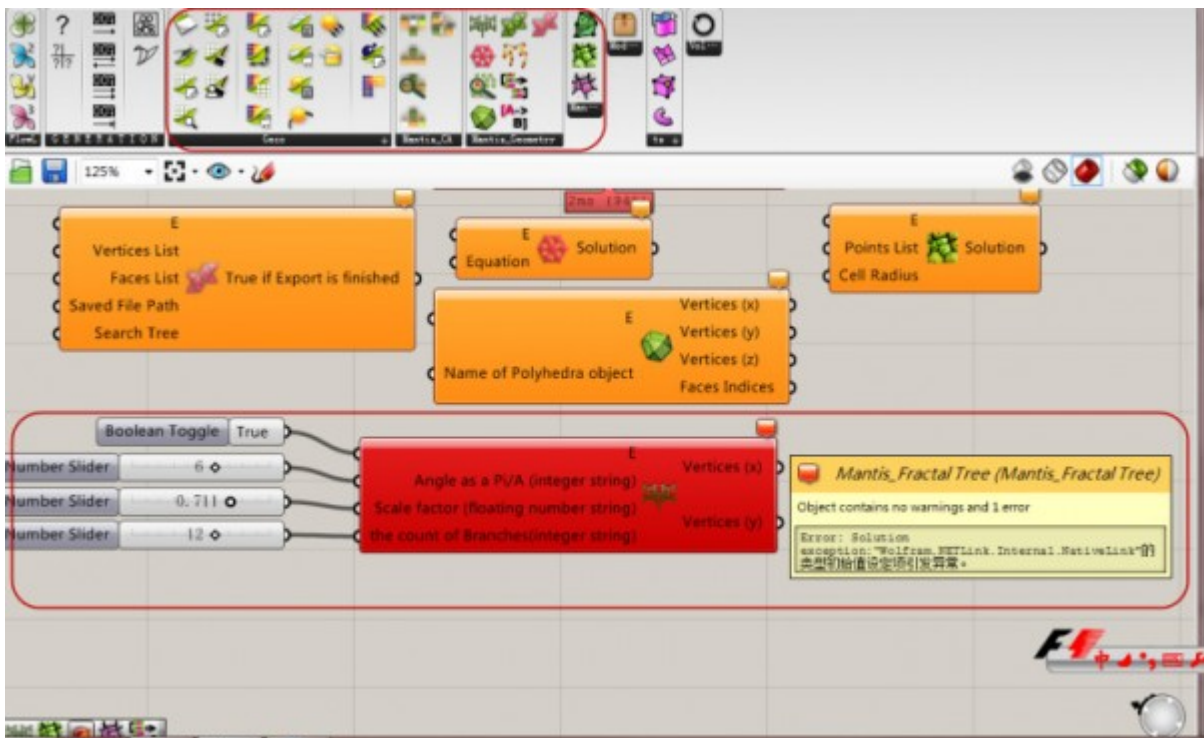
It expands Grasshopper's capabilities by adding a set of components which help in the conversion and creation of Revit files which contain supported geometric algorithms for the Rhino modeled file. In other words, a complex parametrically designed geometry, can be designed in a BIM software, to make the structure much more practical, before presenting or proposing it. Hummingbird basically allows a bi-directional workflow in between Autodesk Revit and Rhinoceros 3D, removing the need to create reference objects. This also helps in better visualizing and analyzing the structural components that are to come into the picture[8,9].



Courtesy of Tim Meador

## 10. Mantis (Structural Analysis)

Mantis is a plugin for grasshopper which directly links Rhinoceros and Mathematica. Mathematica is a tool for technical computing, used by mathematicians, engineers and analysts. It is renowned as the world's best application for computations.



Courtesy of first\_1

Structural systems are formed by the interpretation of lines, curves and points as structural elements and forces, through custom components. All the data analyzed is then exported from Rhinoceros to a FEM (Finite Element Method) analysis software like "SOFiSTiK". The software uses a numerical technique for finding approximate solutions to boundary value problems for partial differential equations harnessed from the prior structural analysis. It basically breaks down a complex problem into simpler parts and then begins to calculate and solve them. This "part to whole" approach truly eliminates a large margin of error and compliments for a much more accurate structural analysis, aiding in a much more robust, stable and balanced parametrically designed structure.

## Conclusion

Such parametric design software and plugins also enable the user to instantaneously generate a wide spectrum of dynamic forms simply by inputting various magnitudes & assigning suitable constraints. This ability to perceive alterations made in real time, allow the architect to generate complex form, which otherwise may not have been thought about due to the sheer complexity in the form, shape or structure of the design.

The mentioned tools & plugins are extremely user friendly and require basic understanding of 3D modeling principles to get started with. The cavernous gaps in between the fields of collaborative architecture, environmental studies and structural engineering, are addressed and bridged. They integrate parametric design with statistical analysis into a single modelling envelope, making the building more practical, unique, dynamic, balanced and sustainable – for a much more green future.

Written by **Aprameya S Pandit**

[1]"Ladybug: A Parametric Environmental Plugin for Grasshopper to help designers create an environmentally-conscious design", (Pg nos. 3128, 3130) Mostapha Sadeghipour Roudsari, Michelle Pak Adrian Smith + Gordon Gill Architecture, Chicago, U.S.A. [http://www.ibpsa.org/proceedings/BS2013/p\\_2499.pdf](http://www.ibpsa.org/proceedings/BS2013/p_2499.pdf)

[2]"Paneling Tools for Grasshopper", (Pg nos.3-89) (to understand the various complex geometries the tools enable it to generate & model), Rajaa Issa, Robert McNeel & Associates. [http://wiki.mcneel.com/\\_media/labs/panelingtools4grasshopperprimer.pdf](http://wiki.mcneel.com/_media/labs/panelingtools4grasshopperprimer.pdf)

[3]"Integration of Outdoor Thermal and Visual Comfort in Parametric Design" (Pg nos.1, 3, 9) Emanuele Nabonii. [http://www.plea2014.in/wp-content/uploads/2014/12/Paper\\_3B\\_2882\\_PR](http://www.plea2014.in/wp-content/uploads/2014/12/Paper_3B_2882_PR)

[4]"Daylight Optimization: A Parametric Study of Atrium Design". (Pg 1, 3)

[5]"Performative Parametric Design of Radiation Responsive Screens", (Pg nos. 580, 582) Henry Marroquin, Mate Thitisawat and Emmanouil Vermisso. [https://www.brikbases.org/sites/default/files/ARCC2013\\_UNCC\\_Conference\\_Proceedings\\_597.pdf](https://www.brikbases.org/sites/default/files/ARCC2013_UNCC_Conference_Proceedings_597.pdf)

[6]“Form Finding, Force and Function: Mass-Spring Simulation for a Thin Shell Concrete Trolley Barn “, Michael W. Weller. <http://dmg.caup.washington.edu/pdfs/MArch.Thesis.MikeWeller.2011.pdf>

[7]“Optimizing a Trussed Frame Subjected to Wind Using Rhino, Grasshopper, Karamba and Galapagos”, Evan J. Gerbo, Edmond P. Saliklisa. <http://content-calpoly-edu.s3.amazonaws.com/arce/1/people/documents/Genetic%20Algorithm%20Paper%20v4.pdf>

[8]“Parametric Tools & The Evolving Design Process”, Liam Taylor. [http://www.aceuoa.org.nz/resources/Parametric\\_Design\\_Presentation\\_Slides.pdf](http://www.aceuoa.org.nz/resources/Parametric_Design_Presentation_Slides.pdf)

[9]“Bio-Origami, Form finding and evaluation of origami structures”, Daniel Baerlecken, Matthew Swarts, Russell Gentry, Nixon Wonoto. [http://cumincad.architexturez.net/system/files/pdf/ecaade2012\\_250.content.p](http://cumincad.architexturez.net/system/files/pdf/ecaade2012_250.content.p)



## SketchUp Tutorials for Architects: The Most Useful Web Sites and Resources

<http://www.arch2o.com/sketchup-tutorials-for-architects-useful-web-sites-resources/>

SketchUp Tutorials for Architects: The Most Useful Web Sites and Resources  
SketchUp is a very powerful tool for architects and designers, as it gives you a realistic view of the actual project you are creating. It turns the pencil drawing into a flexible 3D model which you can orbit in every angle and get a clear conception of the exterior and interior of the building. Here, we have gathered for you the most useful websites from around the internet that provide free access to textures, materials and compatible plugins to increase your productivity and save your time.

### See also:

- [Photoshop for architects: 10 Websites you should visit weekly](#)
- [Architectural Rendering software : Most Helpful 2D and 3D Web Resources](#)
- [BIM Architectural design software: 30 Websites you should visit weekly](#)

### Official SketchUp Sites

1. [SketchUp Home](#) – Trimble homepage
2. [SketchUp](#) – Download Free or Pro version and older versions

3. [Old SketchUp Blog](#) – Old archive for news
  4. [New SketchUp Blog](#) – Official SketchUp Blog
  5. [SketchUp on Twitter](#) – Tweet on Twitter
  6. [SketchUp Facebook Page](#) – Exactly what it says
- 

## **Tutorials and Resources**

1. [SketchUp ARTISTS:](#) This website has many tutorials that provide you with post-processing skills, techniques and easy to follow step by step instructions provided by highly talented professional contributors.
2. [SketchUp Texture Warehouse:](#) Over 30,000 textures and 3D models.
3. [3D Warehouse](#) – Free 3D Models
4. [SketchUp Sage](#) – Links to other great SketchUp resources
5. [masterSketchup.com:](#) This site by Matt Donley offers high-quality tutorials, reviews, resources, tips and tricks, videos and downloads for free. You will find plenty of information whether you are new to SketchUp, or if you can orbit around in SketchUp like nobody's business!
6. [Nomeradona SketchUp VR:](#) A place where you are a lifelong learner of SketchUp. All resources offered by this blog site are shared by the authors themselves.
7. [Nomeradona Blog:](#) A collection of works mostly done in Google SketchUp and rendered in either Vray for Sketchup, Hypershoot, Vray Max, LightUp, and Podium.
8. [Grafica2D3D:](#) An Italian site with plenty of resources and tutorials for SketchUp, Vray, Archicad, Rhino and other architecture designing programs.
9. [SketchUp Extention Warehouse:](#) The best place to find and install add-ons for Sketchup!
- 10 [SketchUcation:](#) SketchUcation provides 3D modeling outsourcing services for architects, CAD technicians, engineers and 3D visualization/animation companies.
11. [SketchUp Video Tutorials:](#) In the official site of SketchUp you can have access to step by step video tutorials to get started with the program.
12. [SketchUp Sage:](#) This FAQ is designed for those of you who are new to SketchUp and are eager to learn more!
13. [One Community:](#) OneCommunity, an open source software website, has released a list of the most realistic plants optimized for SketchUp. The archive includes everything from palm trees to an array of water and bog plants, bamboo shoots, and tropical evergreen trees.
14. [Smustard.com:](#) This site provides SketchUp Users with the tools and plugins they need to increase productivity and facilitate workflow. They also have a forum where you can get your questions answered.

15. **[Designer Hacks](#)**: Library of tips, tricks, and tutorials on SketchUp. Tutorials are conveniently organized into three categories, beginners, intermediate and advanced.
16. **[Sketch This](#)**: SketchUp tutorials, articles, 3D printing, projects and tools for designers.
17. **[3D Vinci](#)**: SketchUp books for design professionals with step-by-step, illustrated exercises.
18. **[CGarchitect](#)**: The most influential website and end-user community providing valuable resources and tutorials for architectural visualization artists.
19. **[RonenBekerman.com](#)**: It is a helpful source of learning on all aspects of 3d architectural visualization.
20. **[Twilight Render](#)**: Twilight Render is a plug that turns your SketchUp scenes into photo-realistic images, from materials to lighting, to environment post-production, animation, and batch rendering.
21. **[FORMFONTS](#)**: Share and download models from 3D visualization artists. 50,000+ 3D models & 2D models and textures that include furniture, people, plants, trees, cars, trucks, airplanes and more.

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### ***Forums and Communities***

1. **[Official SketchUp Community](#)** – Trimble SketchUp folks
2. **[SketchUcation](#)** – Great resourceful SketchUp forum
3. **[Last Forum](#)** – a nostalgic look back in time, archive with original SketchUp content.

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### ***Forums and Communities Non – English***

1. **[CGPinoy Network](#)** Philipines
2. **[SUVN.net](#)** Vietnam
3. **[Biblio3d.com](#)** France
4. **[Sketchando](#)** Spain
5. **[SketchUpBBS](#)** China
6. **[SKETCHUP ESPANOL](#)** Spain





## BIM Architecture – Design software : 30 Websites you should visit weekly

<http://www.arch2o.com/bim-architecture-design-software-30-websites-you-should-visit-weekly/>

## BIM Architecture – Design software : 30 Websites you should visit weekly

Today, every one knows BIM! And we all could have noticed that BIM advantages affected all AEC disciplines, and architecture might be the most beneficial one. We at Arch2O, tried to build up a list of resources that we found useful for BIM users. There is an overwhelming amount of information out there on BIM, however, we have taken the time to search through the best-known BIM blogs, publications, and tools. Here we go!

See also :

- [Photoshop for architects : 10 Websites you should visit weekly](#)
- [“Robotization” of BIM : How Robots Could Improve BIM Workflow](#)
- [Case Study: BIM implementation in Shanghai Tower](#)
- [Why Switch to BIM?](#)

## Blogs

**[BIM 360 Blog](#)**: A blog by Autodesk that keeps you up to date with the latest Autodesk BIM 360 feature news, expert tips, and insider resources.

**[Shoegnome](#)**: For beginners level, Jared Banks' website aims to showcase innovation within the building industry and offer insights into BIM technology. The website features a variety of YouTube tutorials and articles.

**[AEC DevBlog](#)**: AEC Devblog is a good resource for managers and developers using Revit, Navisworks, and other Autodesk AEC (Architecture, Engineering, and Construction) and BIM. The blog is run by Autodesk's Developer Technical Services (DevTech) team.

**[Beyond Design](#)** : aims to showcase innovation within the building industry and offer insights into BIM technology since 2009. It's run by [Autodesk's Navisworks](#) team and covers a variety of tips and tricks, best practices, and insider knowledge to make the most out of BIM software and management.

**[BIM Fix Blog](#)** : Australia's BIM community could get the most recent BIM updates through this blog. BIM Fix Blog may only update once a month, but it posts very useful BIM tips and tricks, every article is worth it!

**[Revit Add-ons](#)** : Tim Grimm covers Revit add-ons and plugins, many of which are free.

**[The Revit Kid](#)**: Good blog for tutorials and tips ! offering a combination of video and text based instruction for novices and seasoned veterans. It also has numerous pages of relevant content, and supplemental material such as a newsletter, and (paid) ebooks and videos.

**[Bond-Bryan BIM Blog](#)**: Good all round ! BIM site by [Bond Bryan](#)'s Rob Jackson that offers lighthearted industry stories. They also cover BIM initiatives, tips and tricks, and promote relevant conferences and industry awards.

**[HOK BIM Solutions](#)** – HOK are one of the leaders in BIM. David Light [@davewlight](#) looks after BIM in London and is a regular on the BIM event circuit.

**[Revit](#)** Everything Technology by David Light

**[The Case for BIM](#)** – [Casey Rutland](#) is an Architect and Associate Director at Arup Associates, specialising in BIM project design, delivery and management.

**[Construction Code](#)** runs by Stephen Hamil, who offers BIM advice while also cataloging his own professional life.

**[Epic BIM](#)** – multiple contributors whose philosophy is Keep It Simple Stupid !

## Publications

**[AECbytes Magazine](#)** *AECbytes* is offering a quarterly print magazine for \$49 a year. They also keep an [updated blog](#).

**[Automation in Construction](#)** This international, research-oriented journal focuses on information technologies in construction. They particularly focus on computer-aided design. Readers can order a year's worth of print articles for \$99.

**[Cadalyst](#)** *Cadalyst's* quarterly print magazine provides software and hardware reviews, illuminates technology trends, and delivers expert advice to help CAD and BIM managers stay up-to-date. Each issue is \$9.95 and \$2.25 for shipping and handling.

**[AECMagazine](#)** *AECMagazine* is a free online UK magazine that publishes bi-monthly. It keeps readers up-to-date on the latest technology solutions in architecture engineering, and construction.

**[Constructech](#)** This magazine zeroes in on the intersection of construction and technology (for example, the latest issue features an entire app catalog that's sorted by how relevant it is to certain professions). It is published every other month.

**[AUGIWorld](#)** *AUGIWorld* is Autodesk User Group International's official magazine which is published once every two months. This in-depth publication provides specialized insight into topics like CAD management, AutoCAD add-ons, and management advice. *AUGIWorld* is reserved for AUGI subscribers only.

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## BIM Free Object Libraries

### **[ARCAT](#)**

For CAD and BIM resources, ARCAT is a one-stop-shop. Their free, no registration system has everything from concrete to pollution control system.

**[Autodesk Seek](#)** A large library of mostly non-generic multi-disciplinary components by Autodesk. Users can quickly find product specifications for over 66,000 commercial and residential building products.

**[The National BIM Library](#)** The National Bim Library offers a collection of free to download generic BIM components that are compatible with the major BIM products. NBS are better know for their specifications but have taken a strong interest in BIM recently. The library is still a little sparse but the basics are in place for a very useful resource.

**[RevitComponents](#)** Some useful free components especially strong on furniture and interiors.

**Revit City** This site has been going a while and there are 1000's of components to download. You need to register in order to be able to download components.

**TurboSquid** This site offers components which you pay for but there are a small amount of free items. TurboSquid have a Revit certification system that ensures the components meet minimum standards. Compare the prices to the time you might spend modeling the items.

**Bimstore** The Bimstore offers a library of BIM content by manufacturers in Revit, Microstation and ArchiCAD format. The content is free to download. You will need to register on the site first. They have an excellent guide to content creation.

**CAD Notes** Very useful website maintained by Edwin Prakoso on everything related to AutoCAD, Microstation and Revit.

**Polantis** Polantis is a free-to-use BIM library that is fantastically organized and simple to use. While its library is a little smaller than others on this list, it's easy to find exactly what you're looking for.

**SmartBim** SmartBim offers product models from over 40,000 families types in 10,000 Revit objects. Need a sprinkler? It's an entire category. An ice maker? They got 'em. A hospital bed? They've got four!

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