

WEBSITES AS A TECHNOLOGY TRANSFER LIBRARY AND SOFTWARE DISSEMINATION SOURCE

Marc Schiler, Madhu Gupta, Anish Tripathi, Karen Kensek and Doug Noble

University of Southern California, School of Architecture, Los Angeles, CA 90089-0291

ABSTRACT

Websites have become the equivalent of libraries, in which information and references are stored. But websites are also hardware stores and car garages which can supply tools and equipment and even repairs and updates for existing tools. One such example is the Master of Building Science website at USC which disseminates information, but also software which runs within the browser on any machine, or can be downloaded to run on specific machines.

ZUSAMMENFASSUNG

Websites sind jetzt wie ein Bibliothek wo man Unterricht und weitere Auskunft findet. Aber ein Website ist auch ein Lager wo man Werkzeug und Teilen findet und überhaupt alte Werkzeug reparieren und erneuern kann. Die Website des Master of Building Science ist ein Beispiel die Information ausgibt aber auch Software dass auf allerlei Rechner lauft innerhalb ein Browser oder abgeladen sein kann.

INTRODUCTION

One of the primary problems in applying research in Solar Energy and Sustainability remains the dissemination of information and the distribution of computer simulation tools to design professionals and the general public. There have been countless seminars and classes, in an attempt to explain passive design principles, supply computer programs and provide materials libraries. As more researchers have begun to use the web to distribute their research and allow individuals to order books and papers on appropriate topics, it has become clear that the web itself could become the seminar.

As web browsers increase in complexity and continue to span a range of computing platforms, it has become possible to write programs that run online or can be downloaded to run on any platform. This means that much teaching can be done online instead of in the classroom.

SOLUTION

The Master of Building Science Laboratory at the University of Southern California has produced a range of teaching, measuring and simulation tools. These consist of programs written in Java, Javascript, Flash and other web based languages and authoring tools. In addition, there have been several programs written to run in Mac or Wintel environments. We have also collected and evaluated other similar websites and downloadable programs. These sites and tools vary from sustainable design advisers to shading mask calculators and tutorials on the path of the sun. They have been created in conjunction with utilities, other schools and organizations.

In order not to duplicate the efforts of other institutions around the country (and the world) other web sites have been surveyed. As a result, a compendium of such sites has been assembled, creating the possibility of providing all the tools one would need for teaching and practice connected to one central site.

SAMPLE PROGRAMS (TOOLS) AVAILABLE ON SITE

There are two versions of **shading masks**. There is a rectilinear mask, which coincides with a Cartesian sun path plot that was developed by Ed Mazria [1]. There is a hemispherical mask, which coincides with the polar coordinate sun path plot that was developed by Victor Olgyay [2].

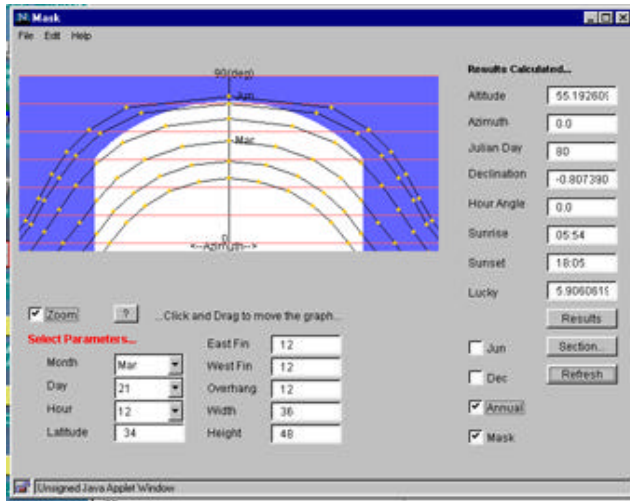


Figure 1: Shading Mask and Solar Plot from Mask 1

Mask1 uses the Mazria method and is written to run entirely within a browser and therefore on any platform. It can be run (or downloaded) from <http://www-scf.usc.edu/~vnarang/> (then choose my Java applets: Shading Mask)

Mask2 uses the Olgyay method, which also allows for the shadow effects of the surrounding site to be plotted onto the same solar path. In order to input the surrounding site, the program includes a complete CAD module so that surrounding buildings and their effects may be plotted. Consequently, the program is far more complex and must be downloaded to run as a standalone program (currently available only on the Wintel platform.)

VRSolar is a teaching tool which helps students and designers to visualize the path of the sun at different times of the year and to see the shadows that are cast. Similar programs have often been written in a standalone version or included as part of a larger standalone CAD package. In this case, however, the entire program runs within a web browser, once again making the program independent of platform. In a teaching environment or for travelling seminars, it is particularly useful to be able to run on any platform (Sun, Mac or Wintel.)

Light.net (see Fig. 2) is a teaching and reference program which includes the theory which is normally taught in classes, examples and interactive scenes where the user can view a room using different light sources, color temperatures, color renderings and illuminance levels. It includes design guidelines for different functions, does simple lighting calculations and provides links to IESNA information, manufacturers' websites and other research institutes. It runs in a browser and is thus independent of platform. Great thought has gone into the hierarchy of the information and showing the right amount of data on a screen, with the option to



Figure 2: Teaching Color Concepts

where he/she is in the overall information structure and can navigate without information overload. Light.net can be accessed or downloaded from the MBS Lab site:
<http://www.usc.edu/dept/architecture/mbs/>

Sustainability has become a significant issue in Architecture, since buildings effect the environment for decades or even centuries. Informed decisions are critical. The **Sustainable Buildings Material Adviser** is useful for teaching, but also particularly useful for providing design guidelines which begin by giving theory and then specific advice, and end by making links to the manufacturers of the materials discussed in the theory and design adviser portions of the website. The theory portion of the site is available in English or Italian (there could be more languages.) The adviser portion and the links can be adjusted for the climate and locale of the user. This prototype is more connected than a stand alone program and significantly more interactive and self adjusting than books on the same subject. See Figure 3 or www.usc.edu/dept/architecture/mbs/theses/SBMA/cov2.html.)

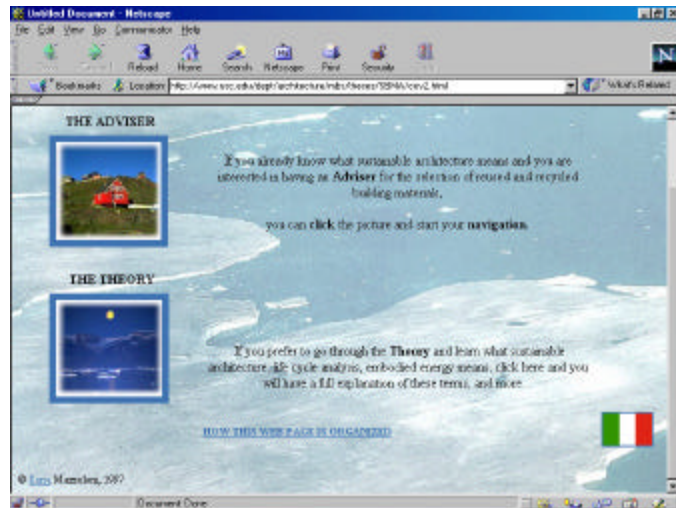


Figure 3: Sustainable Building Adviser (also in Italian)

There are many other programs which were written at USC-MBS Lab. **Comfort** is an interactive game which shows the human comfort chart and shifts the comfort zone based on user input. **WebArc** is a demonstration program which allows a building owner or manager to use the net to access, sense and modify building environmental and security controls from anywhere in the world. There is a program which is the result of examining **Vaastu Shasta Shilpa**, the ancient Hindu building guidelines, which gives advice on cultural, environmental and architectural considerations in planning, site design and building layout. There is a program near completion which teaches the fundamentals of **heat transfer** in buildings.

OTHER TOOL SITES

California has a range of institutions working on similar problems. Several provide tools which can be run within browsers or downloaded. Utilities such as the Southern California Gas Company provide the **Residential Energy Efficiency Design Tool** at <http://reed.aud.ucla.edu/indexdemo.html>, produced by University of California at Los Angeles (UCLA). Pacific Gas and Electric and the University of California at Berkeley (and others) have produced the **Vital Signs** project at <http://www-archfp.ced.berkeley.edu/vitalsigns/Default.htm>. Southern California Edison runs CTAC which provides design consulting and services described at www.biabuild.com/baldy/links/edison.htm#ctac. UCLA also hosts its own computer tool site at <http://www.aud.ucla.edu/energy-design-tools/>, which provides **Solar-2** and **Solar-5.5** energy analysis tools, **Climate Consultant**, which analyzes climates and **Daylit** which calculates natural lighting in buildings. There is a similar site run by Energy Design Resources which provides **eQUEST** energy analysis software, **Energy eVALUator** financial analysis software, **SkyCalc**, an excel based skylighting tool for California at www.energydesignresources.com. Such sites are described and linked to the USC-MBS site.

Finally, unique tools culled from hundreds of websites around the world are included. The Energy Studies in Buildings Lab at the University of Oregon produced **Energy Scheming** and maintains <http://darkwing.uoregon.edu/~esbl/>, although there are modest fees associated with some of the software. [3] The American Forestry Association has created an excellent site and a wonderful browser based tool called the **carbon debt calculator** (<http://www.amfor.org/climate/amforcalc.html>), which calculates the carbon debt of each individual. Such sites are not normally found with a search engine, but combine exactly with the intent of the USC-MBS site.

REFERENCES FOR FURTHER RESEARCH

The USC MBS program has produced a range of papers over the years, referring to the same topics as the tools. This is the more standard part of the site, but valuable as part of the continuum. Not only are the paper citations listed and the thesis titles, but in many instances the more recent papers and theses are available online, to be directly read (html files) or downloaded (doc files). There are many more reference sites which can be added at this point. The National Pollution Prevention Center for Higher Education provides a great deal of further references at <http://www.umich.edu/~nppcpub/resources/>.

CONCLUSIONS

Websites are an ideal library for the dissemination of multi-platform computer simulations and tutorials. They represent such a significant leap in the combination of these potentials that they will change the way that we teach and disseminate information. One such example is <http://www.usc.edu/dept/architecture/mbs/>

ACKNOWLEDGEMENTS

The authors would like to acknowledge all of the students and faculty who have worked on the programs which are linked to or contained within the MBS website: Goetz Schierle, Pierre Koenig, Archit Jain, Sonal Puri, Vagish Narang, Ilaria Mazzoleni, Gloria Chen and Geetika Tandon.

REFERENCES

1. Mazria, Ed.: *The Passive Solar Energy Book: Expanded Professional Edition*, Rodale Press, Emmaus, PA, 1979
2. Olgyay, Victor: *Design with Climate: A Bioclimatic Approach to Architectural Regionalism*, Princeton University Press, Princeton, 1959.
3. Brown, G. Z., J. Kline and T. Sekiguchi "Energy Scheming's Design Advisor". *Proceedings of the 20th National Passive Solar Energy Conference*, Minneapolis, MN, . July, 1995.
4. Kensek, Karen; Noble, D.; Schiler, M.; and Setiadarma, E., *Shading Mask: A Teaching Tool for Sun Shading Devices*, **Automation in Construction**, Volume 5, pp. 219-231, copyright 1996.
5. Noble, Douglas; Kensek, K.; and Mazzoleni, I., *The Sustainable Building Materials Adviser: A Web-Based Tool for Building Design Professionals*, Green Building Challenge '98, Vancouver, Canada, accepted for presentation, October 1998.

6. Jain, Archit; Noble, D., and Kensek, K., *VRSolar: An Interactive Web-based Teaching Tool for Simplified 3D Analysis of Solar Rhythms*, **Automation in Construction**, 1998.