DayMedia
A Multimedia Teaching Package on Daylighting

Mike Wilson, Axel Jacobs
Low Energy Architecture Research Unit
University of North London

Abstract

DayMedia is an interactive web-based teaching package on daylighting issues for architects. It was funded by the EC Leonardo programme under the contract number UK/97/2/00593/PI/I.1.1.c/FPC. It was developed by LEARN, University of North London in collaboration with four other European academic partners. The main objective of the project is to make available the latest results in research in the field of low-energy architecture, in particular the use of daylight in architecture.

Introduction

In the context of the threat of global warming we face the urgent need to reduce the energy consumption of our buildings. The European Commission has been promoting the use of renewable and alternative energies with research grants and many research projects have been undertaken in this field.
When daylight was the primary source of light for the interior, skills were developed that made maximum use of natural daylight. In the last 40 years, these skills have become lost. Energy was available in abundance, so most commercial buildings were artificially lit and air-conditioned. Little thought was given to the daylight performance of buildings.

Aims and Objectives

To help architects and building engineers re-discover the skill of making buildings that actually function the EEC has supported research within the framework of several research programmes such as JOULE and THERMIE which promote renewable energies and rational use of energy.
As a result considerable work has been done in the field of low-energy architecture. However, the dissemination of the results has been rather slow. This is even more true for those who could get the highest benefit and make the biggest impact on the global reduction of the use of energy, namely the architectural practitioners and building engineers, as well as students.
To remedy this situation, the EEC Leonardo programme funded a project co-ordinated by the Low Energy Architecture Research Unit, LEARN, at the University of North London. Participating partners are the Universities of Athens, Florence, and Trondheim, the ENTPE in Lyon, as well as London-based production company ARTEC.
The main objectives of the project were:
- to transfer and disseminate through training the expertise in daylighting design developed in the EC research and development programmes JOULE and THERMIE
- to meet the needs of European professionals with regard to the use of daylighting techniques in buildings
- to provide a flexible training tool ideally suited to the small enterprises that are typical of architectural and consulting engineering practices, i.e. a CDROM based program
- to provide a flexible training tool ideally suited to university students via the web, and integrate aspects of daylighting techniques in the architecture curricula of the academic partners to promote a European dimension in training on architecture
- The project aimed at developing a flexible training package which incorporates the newest

daylighting techniques as well as reintroducing some of the wisdom of the past and making them widely available to practitioners across Europe.

Availability of DayMedia

In the early design stages of DayMedia, the use of proprietary packages and tools was considered since they could have provided flexible page layouts and very sophisticated ways of interacting with the user. However, there are a couple of important aspects that speak against the use of such tools.

The first reason is that the development tools are rather expensive. With the tight budget of the EC projects, no scope was there for buying development suites for all the partners. The second reason is that even if the consortium could have afforded such expenses, none of the partners would have had qualified developers with enough experience in the use of the packages. The main reason, however, is the following: All proprietary browser plug-ins and standalone packages are by no means platform and operating system independent. This would have restricted the use of the DayMedia teaching package to certain computer platforms and operating systems, for example to Microsoft Windows on PCs. In practice, many architects use Apple Macintosh machines while engineers quite often work on SUN or Alpha boxes running a flavour of UNIX. The DayMedia consortium felt that those people should not be excluded. A true platform independent solution was therefore sought.

The best way of presenting information in the internet age is the use of the open HTML standard. Any web browser on any platform should be able to display pages as long as they comply to the HTML recommendation as drawn up by the W3C consortium. A decision was therefore made to produce DayMedia entirely in HTML. The package complies with version 4.01 of the HTML recommendation. To overcome the static nature that is characteristic of HTML pages JavaScript is used, allowing for interactions with the user beyond the classic hyperlink concept. In order to create a consistent look and feel, Cascading Style Sheets (CSS) version 1 are implemented.

Due to the approach taken, the package can be delivered both, via the internet and on a CD-ROM. The pages are be hosted by LEARN at the University of North London under `http://www.unl.ac.uk/LEARN/port/1998/daymedia/index.html`. The nature of the internet ensures maximum availability and dissemination. The only drawback will be potentially long download times, since there are many images and animations requiring a large bandwidth. Alternatively, there are also a ZIP archive and a CD-ROM image of the package available to ensure that everybody that is interested in the teaching package can actually find a way of using it.

DayMedia is made available under the GNU General Public License (GPL). This license which has made the Linux operating system so hugely successful allows for the free use and even the distribution of copies of the packages. Everybody is allowed to take parts out of DayMedia, alter them or even use them in their own packages. However, all alterations must be made available to the DayMedia community, in this case to LEARN as the maintainer. They can then be fed into the main source tree and made available to everybody. Should parts of DayMedia be used in other packages, then they, too will have to be made available under the GNU General Public License.

Contents of DayMedia

The images used in DayMedia are a mix of photographs taken by the partners and computer simulations, mostly done in RADIANCE. This extremely flexible suite of programs by the Lawrence Berkeley Laboratories is designed for creating photorealistic and physically correct images for indoor and outdoor lighting. It allows for the automatic creation of large number of images while altering one or two variables, such as the position of the sun and the geographical latitude of the location. The images could then be looped and animated with JavaScript, resulting in sequences just like an interactive movie clip.

DayMedia is structured into four main categories:

Use of Daylight
Nature of Daylight
Quality of Daylight
Maximising Daylight
Case Studies

The section on the Use of Daylight contains information on active and passive control devices, the transmission of light into the building and the integration of daylight and artificial light. Nature of Daylight discusses different sky types and how they can be simulated, the availability of daylight throughout Europe and the path of the sun. Under Quality of Daylight, questions about glare, the differences in colour temperature of daylight and artificial light and the modelling ability of daylight are looked at. It also informs about measuring light in general and daylight factors and the no-sky line in particular. Maximising Daylight tries to show how building properties such as reflectances, the building geometry, glazing and outside obstructions affect the daylight performance of buildings. Case Studies, finally, looks at a particular project and discusses how the daylighting affected the design of a hospital ward by analysing three different alternatives. It also contains a chapter from Daylight Europe in PDF format.

Although reasonably comprehensive, DayMedia does not aim to be a replacement to the text books written on the subject. It neither covers all possible aspects, nor goes into a deep discussion of the topics. The main objective was to provide a visually attractive supplement to other sources of information, making it easier for the student and architect to comprehend to concepts and formulae given there.

It is hoped that additional pages particularly case studies are produced by other users.

Conclusions

The authors hope that DayMedia will make it easier for the student and architect to understand the basic concepts about daylighting without getting too technical about it. It was tried to visually present and illustrate the topic by providing and interactive tool to accompany existing text books. Because DayMedia is published under the open GPL license, its use is not restricted in any way since this allows the free use and distribution of the package and even alteration of its contents. It is hoped that DayMedia finds a widespread use and individuals and institution will even make contributions to make this teaching package and on-going process and a truly European source of quality information on the topic of daylighting in architecture and a resource for teaching and learning about daylighting.

The authors

Axel Jacobs, Mike Wilson
LEARN, Low Energy Architecture Research Unit
University of North London
School of Architecture and Interior Design
Spring House
40-44 Holloway Road
London, N7 8JL
England
T: +44 (0)20 7753 7006, F: +44 (0)20 7753 5780
W: http://www.unl.ac.uk/LEARN, E: a.jacobs@unl.ac.uk

Images

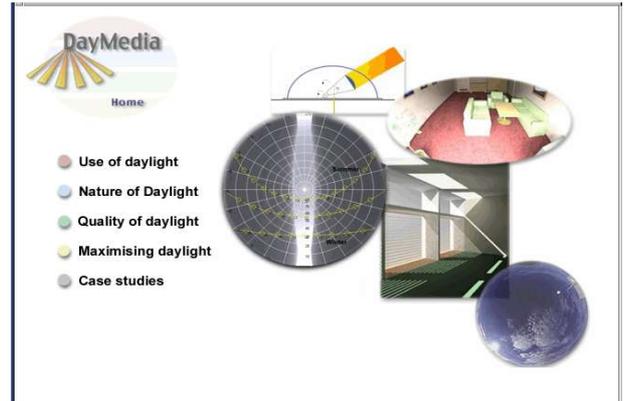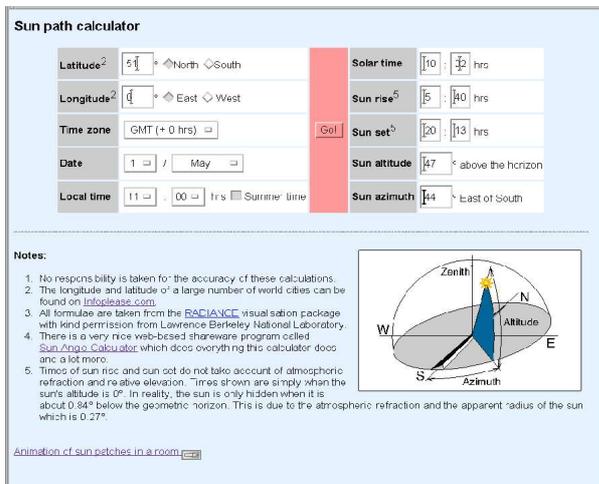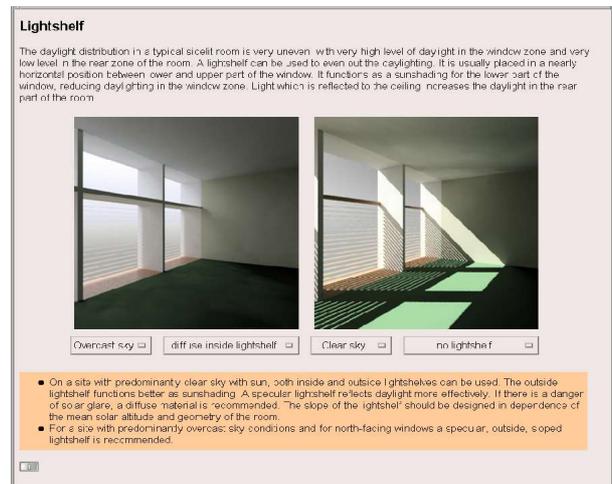Illustration 1: DayMedia welcome screen

Illustration 2: Main screen

Illustration 3: Sun path calculator

Illustration 4: Lightshelfs